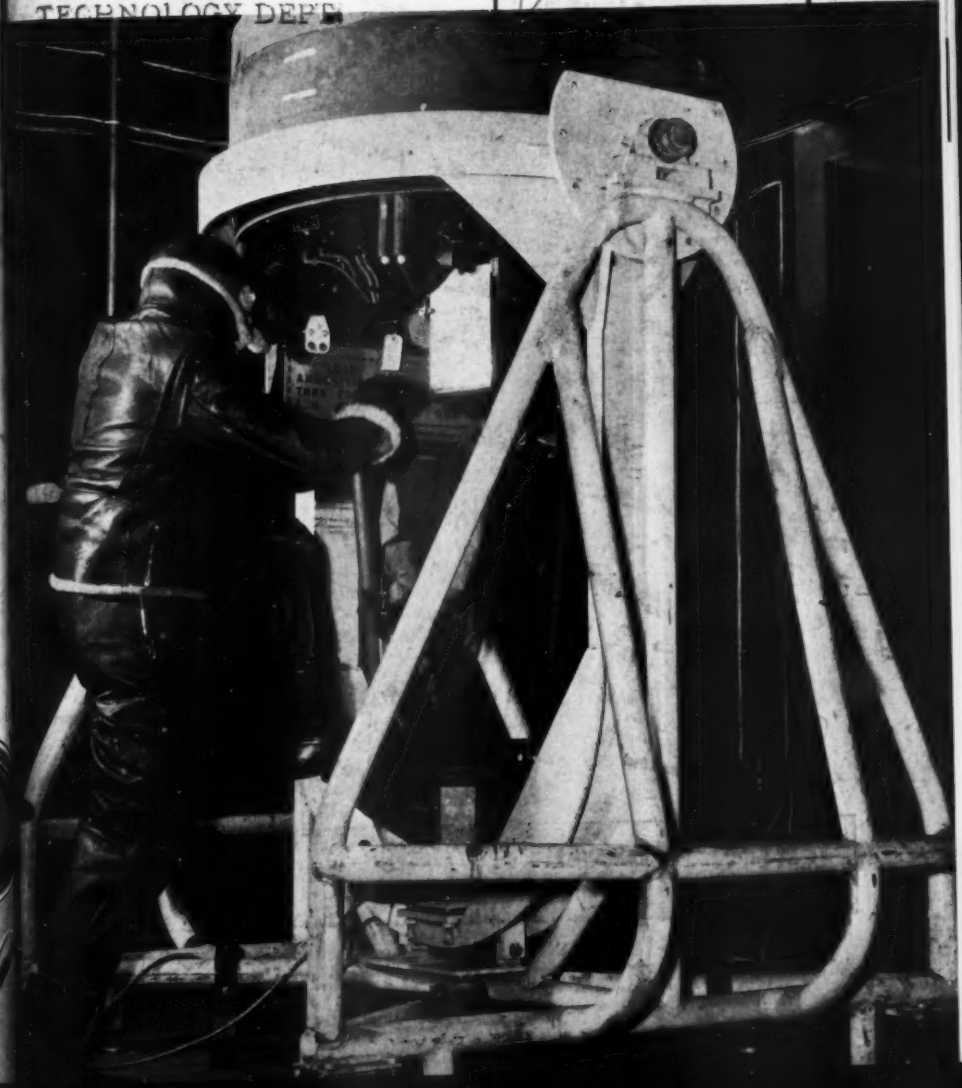
Refrigeration Service Engineer

VOL. 13 NO. 3 ★ ★ MARCH . 1945

TECHNOLOGY DEPT.
MAR 20 1945



2 Angles
ON WHY IT PAYS TO USE CHICAGO SEALS

1. THE REFRIGERATOR OWNER

reasons this way: "Frankly, I don't know what makes a refrigerator 'tick.' So when my service man told me he was using a Chicago Seal, I reminded him I wanted the best. He said Chicago is the only seal with a self adjusting sleeve lock that assures perfect sealing even on bent or scored shafts. That's too technical for me, but it's been good for my refrigerator. The old machine works like new, and I give full credit to Chicago Seals and a smart service man."

2. THE SERVICE MAN

has a "bread and butter" slant on it. "The future of my business depends a lot on the kind of repair jobs I do these days. Short of help as I am, I can't afford to skimp on a job. With the constantly improved Chicago Seals I not only do a better repair job, I do it in less time, with less work, at less cost. Why? Because those Chicago Seals are really easy to handle."

MODERN DESIGN

CHICAGO SEAL CO. 20 N. WACKER DR., CHICAGO 6, ILL.

THE REFRIGERATION SERVICE ENGINEER. Nickerson & Collins Co., Publishers, 435 N. Waller Ave., Chicago 44, Ill. Published monthly. Vol. 13. No. 3. March, 1945. Entered as second class matter March 4, 1938, Chicago, Ill., under the Act of March 3, 1879. Subscription in the United States, $2.00 per year; all other countries, $3.00 per year.

COLD FACTS BY ANSUL
I THINK WE'D BETTER SET OUT A FEW MORE... THE PHAROH NEEDS PLENTY OF ICE FOR HIS BIG COCKTAIL PARTY TOMORROW...
LOU GRANT

EGYPTIANS MADE ICE 4,000 YEARS AGO— BY SETTING OUT WATER AT NIGHT IN POROUS CLAY VESSELS. MOISTURE "SWEATING" TO THE OUTER SURFACE EVAPORATED RAPIDLY TO CHILL AND OFTEN FREEZE THE WATER INSIDE.

RAPID EVAPORATION IS RECOGNIZED AS A BASIC PRINCIPLE OF REFRIGERATION, BUT MODERN REFRIGERATION REQUIRES MORE DEPENDABLE REFRIGERANTS—LIKE **ANSUL LIQUID SULFUR DIOXIDE** AND **ANSUL LIQUID METHYL CHLORIDE.**
—IMMEDIATELY AVAILABLE

Our technical book, "Ansul Refrigerants" (3rd Edition) available upon request

ANSUL CHEMICAL COMPANY, MARINETTE, WIS.
"Now in our 30th year"

AGENTS FOR KINETIC'S "FREON-11," "FREON-12" AND FREON-22"

7 REASONS WHY

"DL" SOLENOID VALVES ARE PREFERRED

1. POWERFUL—Ample power to lift against high pressures.
2. QUIET—Design of plunger and guide tube minimizes objectionable A.C. hum.
3. EASILY INSTALLED—Substantial mounting boss on valve body makes for easy, rigid installation.
4. EASILY SERVICED—Can be disassembled and cleaned without disconnecting refrigerant lines or wiring.
5. POSITIVE CLOSING—Non magnetic needle and seat and strong "kick off" spring assure tight closing.
6. LONG LIVED—Valve bodies are of close-grained non-porous cast brass. Coils are of moisture-proof construction.
7. ECONOMICAL—Draw little current. Replacement parts if required are inexpensive.

FOUR WIRE COIL

One of the features of "DL" solenoids preferred by jobbers and service men is the dual 115-230 volt 4 lead coil. This coil can be used on either 115V60 cycle or 230 volt 60 cycle current by connecting the 4 leads in the right sequence. Correct wiring diagram is shown right on the coil—a great time saver.

No. 681—The No. 681 is of the pilot ➔ **operated type and requires a minimum**

ECONOMICAL—Draw little current. Replacement parts if required are inexpensive.

No. 683-3—This reliable valve, like all "DL" solenoids is designed for use with any fluid that will not attack brass. Furnished with three sizes of orifices, 1/8", 3/16", and 7/32".

Nominal capacity—liquid line

3/16" orifice	3 tons Freon	6-1/2 tons Methyl
7/32" orifice	3-3/4 tons Freon	8-3/4 tons Methyl

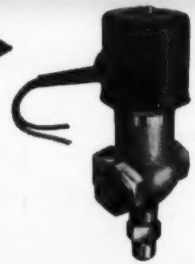
3/8" female N.P.T. connections.

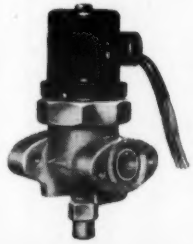
No. 681—The No. 681 is of the pilot operated type and requires a minimum pressure drop of 1 p.s.i. to operate the piston.

Nominal capacity—liquid line

7-1/2 tons Freon 17 tons Methyl

1/2" female N.P.T. connections.





No. 686—The No. 686 is a heavy duty, large capacity pilot operated valve which requires a pressure drop of 1-3/4 p.s.i. to operate the piston when used with refrigerants, 5 p.s.i. on water. It is made with 2 sizes of orifices, 1/2" and 5/8"

Nominal capacity—liquid line

1/2" orifice	11 tons Freon	23 tons Methyl
5/8" orifice	17 tons Freon	34 tons Methyl

DETROIT LUBRICATOR COMPANY General Offices: DETROIT 8, MICHIGAN

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

Canadian Representatives—RAILWAY AND ENGINEERING SPECIALTIES LIMITED, MONTREAL, TORONTO, WINNIPEG

"DL" Heating and Refrigeration Controls • Engine Safety Controls • Safety Float Valves and Oil Burner Accessories • Radiator Valves and Balancing Fittings • Arco-Detroit Air and Vent Valves • "Detroit" Expansion Valves and Refrigeration Accessories • Air Filters • Stationary and Locomotive Lubricators

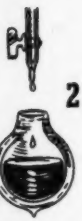
Service Engineers Should Know...

"VIRGINIA" METHYL CHLORIDE IS REALLY LABORATORY TESTED

— the content of each and every container — large or small — is analyzed 3 separate times.

BOILING POINT TEST

1. A measured sample from each cylinder must be water-white in color and when boiled to dryness must record within 25/100 of 1 degree a constant boiling point of minus 23.8°C. This test detects unwanted hydrocarbons, dirt and oil impurities.



ACIDITY TEST

2. The acid content in a sample of known weight must not exceed 6 parts per million; low acidity prevents copper plating and oil sludging.

MOISTURE TEST

3. The moisture in a sample of known weight must not exceed 80 parts per million; — low moisture prevents freezing at expansion valve and refrigerant break-down.

The name "V-METH-L" on the cylinder is your guarantee of quality. Sold by refrigeration supply jobbers everywhere.

VIRGINIA Smelting Co.

WEST NORFOLK, VA.

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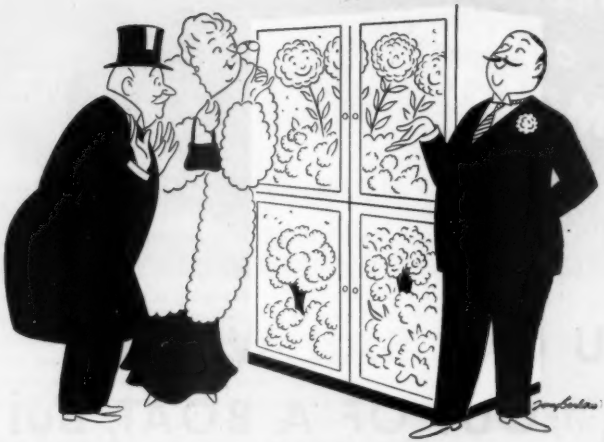
Agents for Kinetic's "Freon-12" — "Freon-22" — "Freon-11"

Happy Tales of Trouble-Free Performance

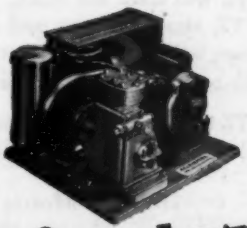


Customer: *"What's going on here?"*

Manager: *"It's funny, but those flowers have been happy ever since I put in that new Kelvinator Condensing Unit!"*

For 30 years the outstanding leader in commercial refrigeration. That's why Kelvinator Condensing Units are famous for giving *more* dependability, *more* economy, *more* performance. That's the reason progressive service men *always* specify Kelvinator.

Kelvinator distributors and zone offices stock a complete line of refrigeration supplies. See them for your installation material such as tubing, controls, dryers, etc.



Kelvinator

DIVISION OF NASH-KELVINATOR CORPORATION, DETROIT

CONDENSING UNITS

SEALED • OPEN

For Your Home—Remember Kelvinator Refrigerators, Electric Ranges, Water Heaters and Home Freezers.

YOU CAN BAIL WATER OUT OF A BOAT, but . . .

. . . you'll never do a job with inadequate measures.

Nowadays, when refrigeration service engineers can't take care of all their calls, if they could finish each job quickly and get on to the next one, their toughest problem would be solved.

TZ will help the R.S.E. Many calls are moisture cases. If he puts in TZ, starts the unit and goes on to the next job, nine out of ten such cases will be finished with the one call. Occasionally another "shot" will be necessary to take care of unusual moisture.

TZ technique means time saved and more ground covered, expenses cut and more profit made.

Destroys Moisture and Neutralizes Acid Chemically

THAWZONE
Fully Protected by U. S. Patents
The PIONEER FLUID DEHYDRANT

HIGHSIDE CHEMICALS COMPANY
195 VERONA AVE.
NEWARK 4, N. J.

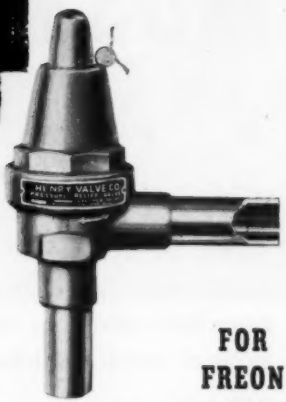
Henry Diaphragm Relief Valve

Instantaneous Pressure Relief with Fast and Positive Reseating

Design of this relief valve is unique in that it incorporates a diaphragm construction with an unusual seating arrangement. The result is an opening and closing snap-action movement. Large surface area of the pressure actuated diaphragm causes instantaneous relief as compared to gradual opening in conventional spring loaded relief valves. When the pressure in a system reaches the relief point, wire drawing, which may ruin a valve seat, can not take place because there is no slow movement of the valve seat disc in the Henry Diaphragm Relief Valve.

This valve is recommended for protection to a system containing a large charge of freon or methyl chloride refrigerant. It may be employed either for relieving high side or low side to atmosphere. It can also be installed so as to relieve from high to low side of system. It meets the requirements of all existing safety codes. Due to its acknowledged efficiency through dependable performance under all conditions of service, the Henry Diaphragm Relief Valve is today widely used in refrigeration and air conditioning installations of the Army, Navy and Maritime Commission.

The Henry Diaphragm Relief Valve is available in ½" F.P.T., ¾" F.P.T., ⅜" O.D. and ⅞" O.D. Solder connections and at pressures ranging from 90 pounds to 300 pounds per square inch. Each valve is individually adjusted, set at pressures ordered and marked with its rated free air passage capacity per minute. Locking device prevents tampering with pressure setting or changes in setting due to vibration.



FOR FREON and METHYL CHLORIDE REFRIGERANTS

Type 542. With solder connections. Extended tube sockets at inlet and outlet ports prevent transfer of installation heat to internal parts.

Type 541. With female pipe thread connections.

Sold by Leading Jobbers

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NEW YORK, N. Y.
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PACKLESS AND PACKED VALVES • STRAINERS • DRYERS FOR REFRIGERATION AND AIR-CONDITIONING
AMMONIA VALVES • FORGED STEEL VALVES AND FITTINGS FOR OIL, STEAM AND OTHER FLUIDS

YOUR SERVICE MUST KEEP THEM ★ ★ ★ SERVING!

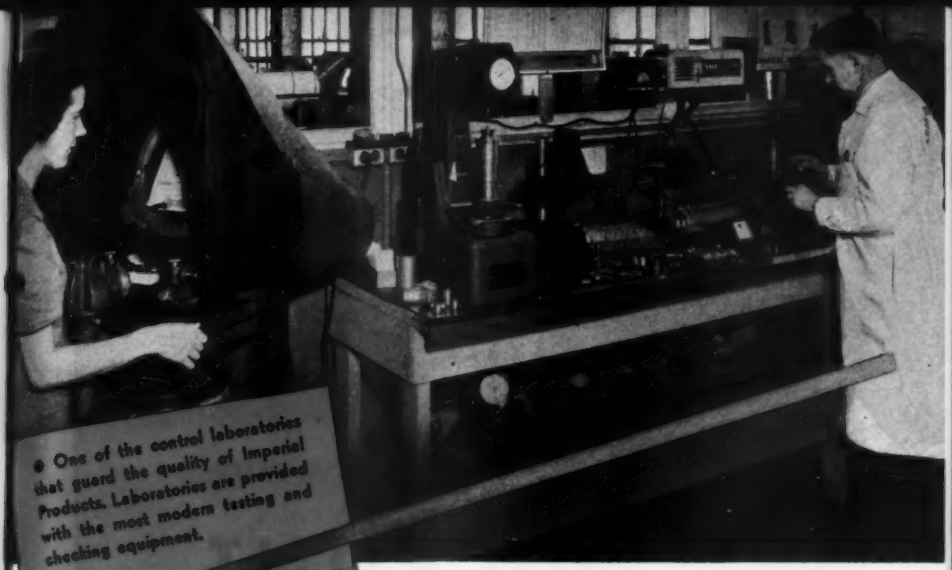
It may be a long time before there will be enough new BRUNNER Condensing Units for all who want them. Therefore your service must keep them serving as long as possible. In this job, it is Brunner's desire to be of utmost assistance.

When you order Brunner replacement parts through your jobber, please make sure you include in your order all the information necessary to enable the jobber to ship the proper part. Always include the serial and model number of the unit as well as the part number. Most Brunner jobbers carry a complete stock of replacement parts. If they should be temporarily out of a desired part that is urgently needed, then it may be ordered direct from the factory. But, for quick service, we suggest you order through your jobber first.

Remember that it is our desire to help you keep all Brunner Condensing Units *operating* and we are prepared to assist you in any way possible.

If you do not have the latest Brunner Catalog of replacement parts, then write for a free copy *today*.

Brunner Manufacturing Co.
Utica 1, New York, U. S. A.



● One of the control laboratories that guard the quality of Imperial Products. Laboratories are provided with the most modern testing and checking equipment.

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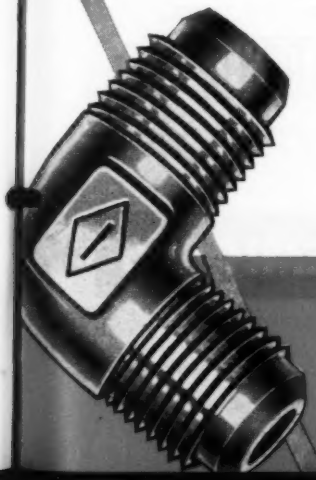
Get Their Start in the Imperial Laboratories

● Control of quality by Imperial reaches out into every step in the manufacture of fittings . . . resulting in fittings that are correctly engineered, accurately machined and have extra strength for refrigeration service.

First among the laboratory controls is the check on hardness and tensile strength of metal used. Imperial nuts, tees, elbows and crosses for refrigeration service are forged from brass. Forging time and temperature are carefully regulated to assure maximum strength and fine, close-grained structure of the metal.

In machining . . . where laboratory control of tools and gages is vitally important . . . threads and seats of fittings come under closest scrutiny. Should there be any doubt about a fitting, an image 20 times actual size is thrown on the screen of an optical projection machine. Here the lead, pitch and angle of threads can be checked with greatest accuracy.

All these and other important controls and inspections guard every fitting that carries the Imperial Diamond "I" . . . the Emblem of Quality which means tight connections that *stay* tight.



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SOME REPLACEMENTS ARE TOUGH TO MAKE...

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DU PONT METHYL CHLORIDE!

FOR DEPENDABLE, satisfactory replacements for refrigerants that are scarce or unavailable—or for original charges or recharging—dry, pure Du Pont Methyl Chloride can meet your every need.

ORDER WHAT YOU NEED—but don't stock up unnecessarily! Du Pont Methyl Chloride is available when you need it. Supplied from stocks in principal cities. To assure yourself rapid deliveries—empty and *return cylinders promptly.*

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DU PONT METHYL CHLORIDE SPECIFICATIONS

Purity	99.5% Methyl Chloride
Moisture	0.008% by wgt. max.
Acid (as HCl)	0.001% by wgt. max.
Residue on Evaporation	0.01% by wgt. max.
Boiling Range (760mm)	—24.6° to —23.6°C.
Color	water white, clear

DU PONT
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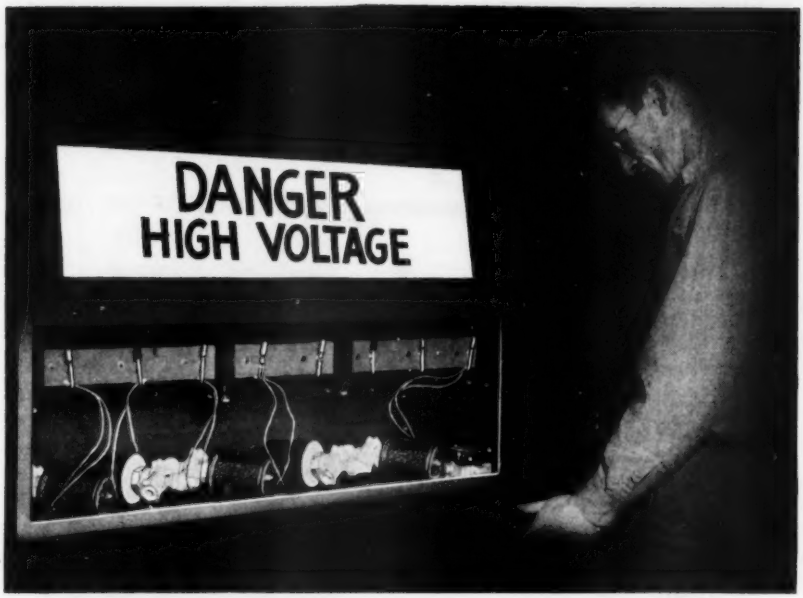
BETTER THINGS FOR BETTER LIVING
...*THROUGH CHEMISTRY*

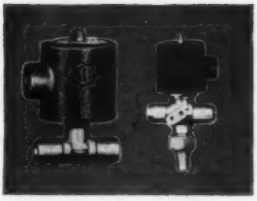
DU PONT ELECTROCHEMICALS



...and we mean HIGH voltage

This is where Alco Solenoid Valves win their "spurs." In this specially designed electrical test circuit, valves from our regular production are subjected to an overload of more than a thousand volts. To meet Alco's own rigid standards, each Solenoid Valve must hold this voltage without breakdown for 30 seconds.

Alco Solenoid Valves are available in a wide range of sizes for positive, dependable flow control of any refrigerant, including ammonia; water, brine, air, steam, etc. They can be installed in any location and operated by any control means. They are ideal for flow control on two-temperature systems. See your Alco jobber, Alco Valve Company, 857 Kingsland, St. Louis 5, Missouri.



Alco Solenoid Valves Type S-1 (left) and S-2 (right). These valves are quiet in operation, waterproof and free from residual magnetism difficulties. All internal working parts of stainless materials. Will not rust or corrode. Available as shown or with standard pipe thread connections.

ALCO VALVE COMPANY

Designers and manufacturers of Thermostatic Expansion Valves; Pressure Regulating Valves; Solenoid Valves; Float Switches; Float Valves.

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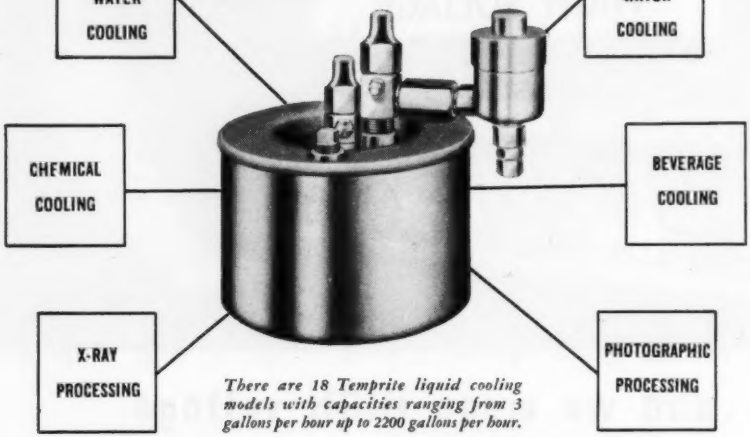
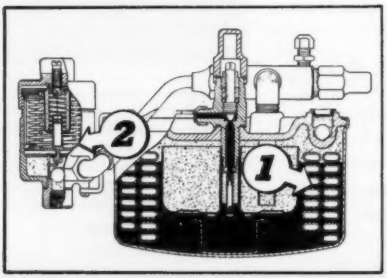
Just a few of the Applications for *Temprite* Liquid Coolers



There are 18 Temprite liquid cooling models with capacities ranging from 3 gallons per hour up to 2200 gallons per hour.

Temprite liquid cooling units have an extremely wide range of applications which should prove highly acceptable for both immediate use and postwar design.

Temprite's instantaneous cooling feature (Fig. 1 below) coupled with the super sensitive temperature control valve (Fig. 2 below) results in a cooling unit capable of producing the maximum in efficiency under all operating conditions.



Temprite exclusive design features

Instantaneous cooling principle . . . Large capacity with small size . . . Accurate temperature control . . . Wide range of temperatures available . . . Coolers constructed entirely of non-corrosive materials . . . Coils constructed of plain copper, tinned copper, or stainless steel.

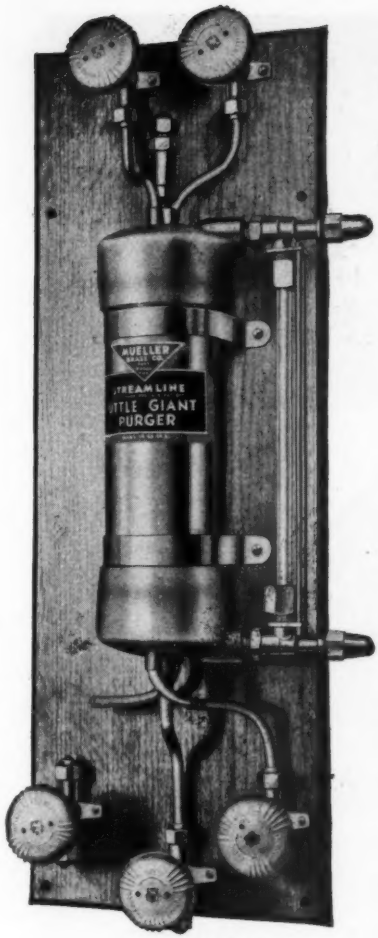
★ ★

Manufacturers: Write us today for specifications on the complete line of liquid cooling units. These units available for military and essential civilian application.

TEMPRITE PRODUCTS CORP.

Originators of Instantaneous Liquid Cooling Devices

45 PIQUETTE AVENUE . . . DETROIT 2, MICHIGAN



REDUCE YOUR OPERATING COSTS WITH THE "LITTLE GIANT" PURGER

The "Little Giant" Purger is an essential item and a profitable investment that quickly pays for itself because:

It reduces power costs
It saves expensive refrigerant
It reduces wear and tear on equipment

It is particularly important that any refrigeration system be purged after a shut-down period of any considerable time. The usual practice is to pump the refrigerant back into the receiver and lock it in by means of valves. Repairs or alterations are made on the system during this time, and it is practically impossible to evacuate the system completely, with the result that the remaining air will cause excessive head pressures.

There is no guesswork when you have the "Little Giant" Purger on the job. The sight glass gives visible evidence of non-condensable gases in the system. There is no loss of refrigerant. It is simple to operate and the reduction in power costs will pay for it many times over. Write us for full particulars and instructions for installation and operation.

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PORT HURON, MICHIGAN

EXPERIENCE

It takes years of engineering experience to make good Air and Water Cooled Condensing Units. Mills can't be beat!

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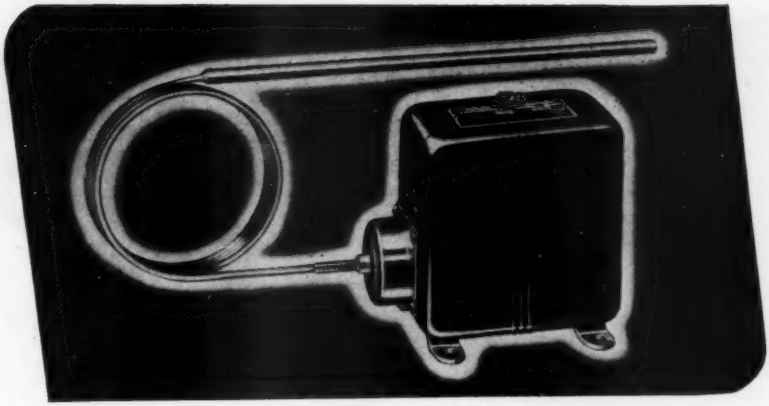

Proper Temperature Control . . . SAVES!

Refrigeration protects critical food supplies against spoilage and waste . . . protects their quality. But the degree of this protection depends upon the efficiency of the automatic control.

That's why PENN developed AVRGAIRE. Designed for walk-in coolers, reach-in boxes and all "above-freezing" applications, AVRGAIRE incorporates a *single, new-type temperature bulb* which is applied in an *entirely new and different manner.* Result? AVRGAIRE holds box temperature within extremely close limits without irregular short-cycling of the compressor. It automatically defrosts on each operating cycle when box load is normal, BUT delays defrosting when box is loaded with warm produce and extra cooling capacity is required. And it maintains proper humidity to minimize dehydration and "sliming" losses.

But get the full story on AVRGAIRE, complete with pictures and diagrams. Write *Penn Electric Switch Co., Goshen, Ind.* Export Division: 13 E. 40th St., New York 16, U.S.A. In Canada: Powerlite Devices, Ltd., Toronto, Ont.

PENN

AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, ENGINES, PUMPS AND AIR COMPRESSORS

ASK YOUR *Ranco* JOBBER ABOUT THEM

No matter what your replacement control problem may be, you can rest assured that your Ranco Jobber is able to supply you with the proper instrument to do a better-than-average job. Even though the production of Ranco Controls is now limited, such a wide selection is available that you can obtain a readily adaptable substitute, if not an exact replacement. A few of the selections are illustrated above on a poster found on display in your Jobber's store.

And, when you install Ranco, you can be proud and confident because Ranco is a beautiful precision instrument—alert, dependable, accurate.

MAKE A HABIT OF WORKING WITH YOUR RANCO JOBBER

Ranco Inc.

COLUMBUS 1, OHIO

The Refrigeration Service Engineer

Vol. 13 No. 3

March, 1945

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

The Cover

Preparing to test-fire an Emerson-Electric power-operated gun turret in —60° stratosphere chamber, the gunner is clad in fur-lined winter flying clothes, his face protected by a special helmet. See story on page 72.

Published by
Nickerson & Collins Co.
433-435 North Waller Ave.
Chicago, 44
Telephones Austin 1303-1304-1305

EASTERN OFFICE
420 Lexington Ave., New York 17
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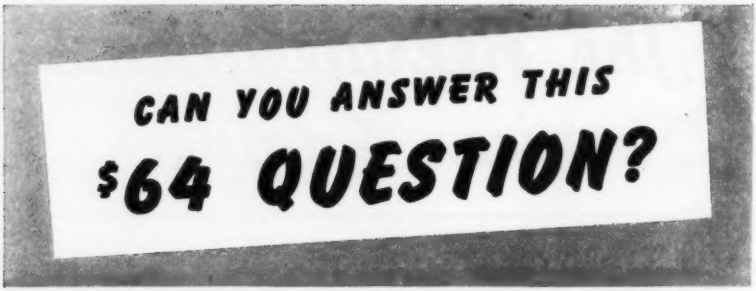


HOW SOON CAN YOU GET THE BEST REFRIGERATION UNITS FOR YOUR PRODUCTS?

"HOW SOON"? is the great big $64 question to stump the experts. And it is true that an exact answer would make a lot of people very happy. Fully aware of many wartime contingencies and uncertainties, we nevertheless feel obligated to keep you informed as much as possible concerning deliveries. Here is information that may be of help to you:

CONVENTIONAL UNITS are in production for high rated orders. The limiting factors are electric motors and castings. In spite of the fact that we have many thousands of motors and tons of castings placed in advance of orders, the increasing volume of business and unprecedented demands of the war on the facilities of the motor manufacturers and foundries have created an acute shortage. We advise manufacturers to place second and third quarter requirements at once and others to anticipate at least six months.

COMPRESSORS are in increasing demand due particularly to the growing replacement market which has resulted from restrictions or "freezing" of many types of equipment for the past three years. There are some critical materials in compressor manufacture and some manpower problems.

We suggest that you anticipate requirements at least three to six months, depending on the rating.

HERMETICS—Production discontinued for the duration. Samples for postwar products are available to legitimate manufacturers.

WRITE OR WIRE FOR FURTHER INFORMATION

Now . . . and Postwar . . . Chieftain Is the Leader.

Chieftain

TECUMSEH PRODUCTS CO.
TECUMSEH • MICHIGAN

Government Bureaus—*News and Rulings*

RULINGS and announcements issued by the various Government Bureaus that are of general interest to the refrigeration service industries are summarized below. Only the essential facts are given in most cases, and those who desire further or more complete information on any specific regulation or announcement are advised to write the proper Government agency.

S S S

Motor Makers Given More Time to Order Parts

TO ALLOW commercial type electric motor manufacturers more time to plan their schedules, the War Production Board will give motor users advance authorizations to purchase for two quarters, WPB announced February 28. Previously, advance authorizations were granted for only one quarter, officials explained. This action was taken because it was found that many of the components needed must be ordered by motor manufacturers weeks or months ahead of the calendar quarter in which the motors and generators are assembled.

Under the revised order, applications for authorizations will continue to be filed on a quarterly basis but will be filed about two and a half months ahead of the first of the two quarters to which the authorization will apply instead of 30 days or more ahead of the quarter as was previously the case. Applications must be made on Form WPB-3825 on or before the tenth day of April 1945, the tenth day of July 1945, and quarterly thereafter. No new applications will be required for authorizations for the second quarter of 1945 from applicants who have previously applied, it was explained. WPB will issue this authorization on Form GA-2305, beginning February 22, 1945, on the basis of applications previously submitted. If no application has been submitted previously and a second-quarter authorization is desired, an application on Form WPB-3825 will be required, however.

Control over distribution will be retained since advance authorizations will be subject to reduction, enlargement or other modifications whenever review of the applicant's situation reveals that such action is warranted, officials said.

Form WPB-3825 has also been revised, and copies of both the revised order and form will be sent to all applicants who have previously applied.

S S S

Refrigerated Display Cases

AUTHORIZATION to manufacture approximately 7,500 refrigerated display cases has been granted under the program announced by the War Production Board in October 1944 WPB announced February 23. Production of 8,000 cases was originally planned for replacement purposes during the 12-month period beginning October 1, 1944. The balance of the program will not be assigned, however, because of the present critical shortage of materials, officials explained.

In general, authorizations were made and material allocated with a view to permitting production where it would not require materials, components, facilities or labor needed for war purposes and would not otherwise adversely affect or interfere with production for war purposes. Each applicant's situation with respect to production and distribution facilities and manpower available were taken into consideration in assigning the quotas, officials explained.

S S S

Electric Motors Still Critical

LITTLE hope for immediate improvement of electric motor supply for civilian use is reported by W.P.B. Some types may become more difficult to secure before the situation improves. Production of fractional horsepower motors will remain at the fourth quarter level of 1944 which will hold users to fourth quarter delivery for the present.

The Integral Horsepower Electric Motor Advisory Committee indicates that production for the next six months at least will be as critical as any period in 1943 or 1944.

W.P.B. programs involving increases in electric equipment requirements have been initiated. The increased production of war equipment, together with manpower shortage and probable tight supply of material such as copper and aluminum sheets or wire, and steel castings will make increased production of motors difficult.

CMP Regulation 9A Amended

THE WPB regulation on "Parts and Materials for Repairmen" was amended on February 15 to emphasize the exact limits in which the regulation may be used to secure parts and materials. The amount of copper wire which refrigeration repairmen may buy is reduced by the following provisions:

Only the following kinds of repairmen may buy any copper wire, and they must not buy more than the amount which this paragraph says they may. Refrigeration repairmen, domestic appliance repairmen, electricians, electrical contractors, and radio repairmen may buy $75 worth of copper wire in a calendar quarter, or 10 per cent of what they used in making repairs in 1941, whichever is more. However, none of these repairmen may use the second way of finding out how much wire he may buy (10 per cent of 1941) unless he has actual records in his possession which show how much copper wire he used for repairs in 1941, and in addition, unless he actually figures out and keeps the figures in his possession showing how much wire he is permitted to buy in each quarter.

This new limitation applies immediately. Any repairman who has already bought more than these amounts cannot buy any more copper wire during the first quarter of 1945. Any repairman who has not yet bought more, can only buy in the whole quarter the amount permitted in this paragraph. Any repairman who buys any steel, copper or aluminum under this paragraph must keep a separate record of the amount which he buys in each quarter. It is not sufficient that he merely keep the copies of his purchase orders with copies of his other purchase orders. A repairman may buy as much other material and repair parts as he needs for his maintenance and repair work.

When buying materials and parts under this regulation a repairman must put on his order and sign a certification in substantially the following form:

"CMP allotment symbol V-3; Preference Rating AA-3: Repairmen under CMP Regulation 9A.

"The undersigned purchaser certifies, subject to the penalties of section 35 (a) of the United States Criminal Code, to the seller and to the War Production Board, that, to the best of his knowledge and belief, the undersigned is authorized under applicable War Production Board regulations or orders to place this delivery order, to receive the items ordered for the purpose for which ordered, and to use any preference rating or allotment number or symbol which the undersigned has placed on this order."

If a repairman does repair work for persons who have the right to use an allotment symbol to buy controlled materials and a preference rating of AA-3 or higher to buy non-controlled materials and parts for their own maintenance, and repair, the repairman may use that rating and symbol to buy what he needs to do their work or to replace in inventory what he has already used for that purpose.

A considerable amount of additional text is added in the amended regulation to define "maintenance" which is permitted under it and emphasize that no copper wire should be used except to make a minimum of necessary repairs.

S S S

Maximum Refrigerator Prices in Canada

EFFECTIVE March 1, a new order was issued by the Canadian War Prices and Trade Board establishing maximum prices for used mechanical refrigerators. Under the schedule contained in the order, maximum selling prices are established for rebuilt electric and gas operated household refrigerators. For refrigerators produced and released during and prior to the year 1940, according to size, maximum selling prices are established as follows:

4 cu. ft. but under 5 cu. ft., $160.
5 cu. ft. but under 6 cu. ft., 184.
6 cu. ft. but under 7 cu. ft., 200.
7 cu. ft. but under 8 cu. ft., 224.
8 cu. ft. but under 9 cu. ft., 240.
9 cu. ft. but under 11 cu. ft., 280.

For purpose of above Schedule cubic content is to be based on the rating of the National Electric Manufacturers Association.

For refrigerators produced or released by the manufacturer during and after the year 1941: 90 per cent of the original retail selling price to the consumer as set out in the manufacturer's list.

S S S

Fluorspar Still Scarce

WHILE supplies of acid grade fluorspar are adequate at the present time to meet the minimum basic essential requirements, it is expected that the demand for it will increase substantially and that supplies of this mineral for non-essential uses will not be available for some time to come, the WPB announced February 27.

(Continued on page 58)

A Survey on

THE SERVICE BUSINESS

By H. D. BUSBY, Associate Editor
THE REFRIGERATION SERVICE ENGINEER

THIS survey is the result of an analysis of 1304 service companies. Included in this study is such pertinent information as the number of employees, related business interests and an interesting nation-wide survey of SERVICE CHARGES.

FROM a study of 1304 questionnaires recently received from service companies all over the United States and Canada comes an interesting picture of the refrigeration service field of today. For example, it shows that in addition to his refrigeration work the refrigeration service engineer is engaged in everything from the job of deputy sheriff to manufacturing. He is extremely sales minded and is making extended plans for after the war. He is generally over-worked and short handed at present but is highly optimistic about the future and is usually enthused about his particular field of endeavor. His service rates on an average have not changed since before the war and there is still a wide variation in these rates from one section of the country to another.

The questionnaire from which this information was taken is a registration form of the new Refrigeration Service Bureau of the Society. The questionnaire was divided into two sections, one pertaining to service and the other to sales. A few questions in each provided the information to follow.

Size of the Average Company

The size of those companies reporting is gauged by the number of service men employed. While no figures are available on the size of the average company before the war it was quite generally thought that the percentage of one man companies ran high compared to those employing one or more men. It may be assumed that the removal of refrigeration men to the armed forces and to war plants has reduced the number of one man companies. On the other hand, those companies who have always employed additional men now find themselves short handed as compared to pre-war days, thus reducing two and three men pre-war companies to a one man status. Many pleas for help in securing additional men and notations on the questionnaire indicating the additional men employed before the war bears out this statement.

Referring to Table 2, second column, we find that 1,304 companies provide employment for 4,438 service men including the owners, or an average of 3.4 men per company. Indications are that this figure would be increased to 4.6 men per company if the men were available.

Number of Employees

Table 1 showing the percentage of companies employing an indicated number of men shows that only 19.5% of the companies are of the one man type, while 78% of those reporting fall within the first four classifications shown in Table 1 or those employing three men or less. The figures used in this table and in table 2 do not include sales or office help. They are taken from the answers to the question, "How many service men do you normally employ?"

TABLE 1. PERCENTAGE OF COMPANIES EMPLOYING INDICATED NUMBER OF MEN.

No. of Men Employed	No. of Companies Reporting	Percentage
0	254	19.5
1	252	19.3
2	260	20.0
3	250	19.2
4	121	9.3
5	54	4.1
6	27	2.1
7	17	1.3
8	15	1.1
9	10	.8
10	10	.8
11-15	16	1.2
16-25	15	1.1
26-40	3	.2
Total.....	1304	100.0

TABLE 2. POTENTIAL SALES OUTLETS BY STATES AND PROVINCES

State	Number Reporting	Number of Employees (Including Employer)	Do You Sell Refn. Yes	No	No Ans.	Interested in Selling Other Appliances Yes	No	No Ans.
Alabama	11	40	7	4	..	10	1	..
Arizona	7	15	4	3	..	7	..	..
Arkansas	8	25	6	1	1	8	..	..
California	86	269	44	23	9	75	6	5
Colorado	27	83	18	7	2	22	3	2
Connecticut	29	87	15	7	7	23	4	2
Delaware	2	15	2	..	..	2	..	..
Dist. of Col.	5	35	3	1	1	4	1	..
Florida	21	65	17	3	1	19	2	..
Georgia	11	38	7	3	1	9	2	..
Idaho	12	21	9	2	1	11	1	..
Illinois	84	295	44	33	7	72	8	4
Indiana	46	129	24	16	6	30	10	6
Iowa	28	96	23	3	2	24	4	..
Kansas	18	39	10	7	1	14	2	2
Kentucky	10	23	7	2	1	8	..	2
Louisiana	9	30	7	2	..	8	..	1
Maine	9	38	6	3	..	7	1	1
Maryland	18	71	11	4	3	15	2	1
Massachusetts	59	245	42	10	7	44	7	8
Michigan	66	187	37	21	8	55	6	5
Minnesota	30	106	20	8	2	24	5	1
Mississippi	4	10	2	2	..	4	..	..
Missouri	40	154	14	15	11	30	4	6
Montana	3	10	3	..	..	3	..	..
Nebraska	21	60	12	6	3	16	4	1
Nevada	1	3	1	..	..	1	..	..
New Hampshire	4	21	4	..	..	4	..	..
New Jersey	35	154	20	12	3	30	3	2
New Mexico	5	7	4	1	..	5	..	..
New York	110	299	68	35	7	94	13	3
North Carolina	24	101	21	1	2	20	1	3
North Dakota	3	4	2	1	..	3	..	..
Ohio	103	403	61	33	9	79	16	8
Oklahoma	18	53	12	4	2	15	2	1
Oregon	14	36	8	5	1	13	1	..
Pennsylvania	86	319	51	25	10	65	18	3
Puerto Rico	2	4	1	1	..	2	..	..
Rhode Island	8	28	7	1	..	6	2	..
South Carolina	4	28	4	..	..	4	..	..
South Dakota	5	15	2	3	..	5	..	..
Tennessee	16	63	11	5	..	12	3	1
Texas	40	157	25	9	6	35	3	2
Utah	8	26	4	3	1	8	..	..
Vermont	5	18	1	3	1	2	..	3
Virginia	14	46	8	4	2	12	2	..
Washington	23	85	18	4	1	20	1	2
West Virginia	12	38	5	5	2	9	1	2
Wisconsin	32	106	23	7	2	26	1	5
Wyoming	5	15	3	2	..	3	2	..
CANADA								
Alberta	3	11	1	1	1	3	..	..
British Columbia	5	15	4	1	..	5	..	..
Manitoba	3	15	2	1	..	1	2	..
Novia Scotia	4	16	3	1	..	3	1	..
Ontario	36	117	26	6	5	32	3	1
Prince Edward Island	1	4	1	..	..	1	..	..
Quebec	10	38	6	3	1	6	3	1
Saskatchewan	1	2	1	..	..	1	..	..
TOTAL	1304	4433	811	363	130	1069	151	84

A Future Ready Built Sales Organization

Table 2 provides a picture of how sales minded the service field is and how many are interested in sales after the war. In answer to the question, "Do you sell refrigeration equipment other than parts, accessories, etc., used in installation and service?" 811 or 62% of the companies replied that they sell such equipment as they can secure at this time. In answer to the question, "Are you interested in selling other lines?" 1,069 or 82% answered "Yes." The majority of these specified certain makes and kinds of equipment they would like to sell and many stated the plans they are making for sales after the war such as moving to larger quarters, building sales rooms and securing franchises for various lines of equipment.

Other Business Interests

In answer to the question, "What other lines of business are you engaged in?" came both interesting and startling replies. The majority, or 51% are engaged in refrigeration sales and service exclusively but the remaining 49% are engaged in everything from operating a paper mill to architectural work. Electrical work of various kinds takes the highest percentage (27%) as would be expected, with heating equipment rating next. Under manufacturing, sales and miscellaneous came some rather puzzling replies in that the other lines the service companies are engaged in are so totally unrelated to the service business. Nearly all of the "puzzling" other lines of business came from the rural sections where widely diversified lines may often be found under one roof.

The Tabulation in Table 3 shows the various lines of business engaged in.

Average Service Charges

Table 4 shows the low, high, and average service rates in each state, province, and principal city in the United States and Canada. Where individual cities of any state are listed the figures are not included in the state or province. In other words, the rates shown for the state or province are for all areas outside the city limits. The rates reported do not indicate what portion of an hour the minimum rate covers but it may be assumed that all calls requiring less than one hour are charged the minimum rate while calls requiring one hour or more will be charged at the rate of the first hour plus the rate after the first hour.

TABLE 3. VARIOUS LINES OF BUSINESS ENGAGED IN

	No.	Per-cent
Engaged in refrigeration and air conditioning sales and service only:	665	51
Electrical Work:	350	27
Electrical Repairs	194	
Electrical Appliances	123	
Electric Contractors	18	
Electricians	13	
Electrical Engineer	1	
Electrical Equip. Export	1	
Heating Equipment, Stokers, Hot Water Heaters:	107	8.2
Motor Rewind & Pump Repairs:	32	2.4
Manufacturing:	45	3.4
Radios	6	
Hotel Equipment	2	
Cabinets	6	
Ice & Electricity	21	
Special Refrigerators	1	
Store Fixtures	1	
Soda Fountains & Ice Cream Coolers	1	
Steel Products Specialty	1	
Cold Rooms	3	
Custom-Built Laboratory Equipment	1	
Candy Making	1	
Paper Mill	1	
Cold Storage:	26	2
Sales of Other Than Refrigeration Equipment:	61	4.6
Automobile Tires	5	
Bottled Gas	9	
Store Equipment & Fixture	23	
Creamery	1	
Deep Well Pumps	1	
Distributor of Dairy Products	1	
Department Stores	2	
Domestic Water Systems	1	
Frozen Foods	1	
Farm & Dairy Machinery	4	
Furniture Dealer	1	
Grocery	1	
Hardware Stores	6	
Metal Kitchens & Trailers	1	
Paint & Wall Paper	1	
Restaurant & Hotel Supplies	3	
Miscellaneous:	18	1.4
Industrial Engineer	1	
Farming	5	
Servicing Bakery Equip.	1	
Welding	4	
Cafe & Apartment Rentals	1	
Billiard Parlor Owner & Service Station	1	
Deputy Sheriff	1	
Outdoor Advertising	1	
Woodworking Plant	1	
Mechanical Contractors	1	
Architect	1	
Total	1304	100

TABLE 4. SURVEY OF SERVICE RATES IN THE UNITED STATES AND CANADA
(Based on a Survey of 1304 Service Companies)

STATE City	LOW			HIGH			AVERAGE		
	Minimum	First Hour	Additional Hours	Minimum	First Hour	Additional Hours	Minimum	First Hour	Additional Hours
ALABAMA	$1.50	$1.50	$1.50	$5.00	$3.50	$3.50	$2.55	$2.50	$2.05
ARIZONA	1.60	1.60	1.60	2.50	2.50	2.50	1.89	2.43	2.10
ARKANSAS	1.50	1.50	1.50	3.00	3.00	2.50	1.92	2.20	1.85
CALIFORNIA	1.50	2.00	1.50	3.00	4.50	3.00	2.35	2.45	2.30
Long Beach	2.25	2.25	2.25	2.50	2.50	2.50	2.30	2.30	2.30
Los Angeles	2.00	2.00	1.50	3.50	3.50	3.50	2.50	2.70	2.40
San Diego	2.00	2.00	2.00	2.50	3.00	2.50	2.25	2.65	2.15
COLORADO	1.00	1.50	1.25	2.00	3.00	2.50	1.50	1.95	1.75
Denver	1.50	2.00	2.00	3.00	3.00	2.50	2.05	2.35	2.15
CONNECTICUT	2.00	2.00	1.50	2.50	3.00	3.00	2.20	2.30	2.00
Hartford	1.50	2.00	2.00	2.00	2.30	3.00	1.90	2.05	2.10
DELAWARE	2.00	2.50	2.50	2.00	2.50	2.50	2.00	2.50	2.50
WASHINGTON, D.C.	1.50	1.50	1.50	2.50	4.25	3.00	2.15	2.90	2.50
FLORIDA	2.00	1.50	1.50	3.00	3.00	2.00	2.05	2.20	1.85
GEORGIA	1.50	1.50	1.50	2.50	3.50	3.50	1.90	2.05	1.95
IDAHO	1.50	1.50	1.50	3.00	3.00	3.00	2.00	2.20	2.00
ILLINOIS	1.25	1.25	1.25	3.00	3.00	3.00	1.90	2.18	1.90
Chicago	2.00	2.50	2.00	3.00	3.90	3.00	2.60	3.10	2.70
INDIANA	1.25	1.25	1.25	3.00	3.75	3.00	1.95	2.25	1.80
Evansville	2.00	2.00	2.00	3.00	3.00	2.50	2.60	2.60	2.20
Indianapolis	1.50	1.50	1.50	2.00	3.00	3.00	1.90	2.05	2.05
IOWA	1.00	1.00	1.00	2.25	2.25	2.25	1.80	1.70	1.55
Davenport	1.50	1.50	1.75	2.50	2.25	2.25	1.80	2.05	1.85
Des Moines	1.50	1.50	1.50	2.00	2.00	2.00	1.80	1.90	1.90
Sioux City	1.50	1.50	1.50	2.00	2.00	1.75	1.70	1.65	1.60
KANSAS	1.00	1.00	.80	2.50	2.50	2.50	1.75	1.80	1 66
KENTUCKY	1.00	1.25	.85	1.50	2.50	2.50	1.40	1.70	1.60
Louisville	1.50	1.50	1.50	2.25	3.00	2.25	1.85	2.25	1.85
LOUISIANA	1.75	1.75	1.75	2.50	3.00	2.50	2.10	2.25	2.15
MAINE	1.25	1.25	1.25	3.00	3.00	2.00	2.10	1.95	1.75
MARYLAND	1.25	1.25	1.25	3.00	3.00	2.50	2.05	2.05	1.80
Baltimore	1.50	2.00	2.00	2.50	3.00	2.50	1.90	2.40	2.15
MASSACHUSETTS	1.50	1.50	1.25	3.00	3.00	2.50	2.25	2.30	1.90
Springfield	2.00	2.00	1.50	2.50	2.50	2.00	2.10	2.30	1.90
Worcester	1.50	2.50	2.00	3.00	2.75	2.50	2.85	2.60	2.10
MICHIGAN	1.00	1.00	1.00	2.50	3.50	3.00	2.35	2.30	2.00
Detroit	2.50	2.50	2.00	3.50	5.25	3.50	2.70	3.10	2.60
Flint	1.75	2.00	1.75	2.50	2.50	3.50	2.05	2.15	2.25
MINNESOTA	1.50	1.50	1.25	3.00	3.00	2.00	1.90	2.00	1.60
Minneapolis	2.00	2.00	2.00	2.50	2.50	2.00	2.20	2.35	1.95
St. Paul	2.00	3.00	2.00	3.00	3.00	2.50	2.55	2.98	2.15
MISSISSIPPI	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
MISSOURI	1.00	1.50	1.50	2.75	2.75	2.75	2.05	1.90	1.70
Kansas City	2.00	1.50	1.50	2.50	3.00	2.50	2.10	2.50	2.00
St. Louis	1.75	1.75	1.75	3.40	3.40	2.80	2.20	2.85	2.25
MONTANA	1.00	1.75	1.75	2.00	2.00	2.00	1.40	1.85	1.85
NEBRASKA	1.00	1.00	1.00	1.50	2.50	2.50	1.40	1.65	1.45
Grand Island	1.50	1.50	1.50	1.50	2.50	1.50	1.50	1.75	1.50
Omaha	1.75	1.75	1.75	2.00	3.00	2.00	1.95	2.30	1.95
NEW HAMPSHIRE	2.00	2.00	1.50	3.00	3.00	2.50	2.25	2.25	1.80
NEW JERSEY	2.50	1.20	1.20	3.50	3.50	2.50	2.50	2.65	2.05
Jersey City	2.50	2.50	2.50	3.00	4.50	3.00	2.50	3.35	2.75
Newark	2.50	2.50	2.50	2.50	2.50	3.00	2.50	2.50	2.75
NEW MEXICO	1.50	1.50	1.50	2.00	2.40	2.40	1.75	2.18	1.88

TABLE 4. (Continued) SURVEY OF SERVICE RATES IN THE U. S. AND CANADA
(Based on a Survey of 1304 Service Companies)

STATE City	LOW			HIGH			AVERAGE		
	Minimum	First Hour	Additional Hours	Minimum	First Hour	Additional Hours	Minimum	First Hour	Additional Hours
NEW YORK	$1.00	$1.50	$1.50	$3.50	$3.50	$3.00	$2.05	$2.25	$1.85
Brooklyn	2.00	2.00	2.00	3.50	3.50	3.50	2.25	2.98	2.53
Buffalo	2.00	2.00	2.00	3.00	3.00	2.00	2.80	2.37	2.00
New York City	2.00	2.50	1.50	3.50	3.50	3.50	2.54	2.96	2.48
Syracuse	1.75	1.75	1.75	3.00	3.00	2.00	2.32	2.26	2.26
NORTH CAROLINA	1.00	1.50	1.50	2.25	3.50	2.50	1.77	1.77	1.63
Wilmington	1.50	1.50	1.50	2.50	2.50	2.50	2.20	2.20	2.10
NORTH DAKOTA	1.00	2.00	1.75	2.00	2.00	2.00	1.50	2.00	1.75
OHIO	1.75	1.75	1.75	3.00	3.00	2.00	1.98	2.13	1.73
Akron	1.50	1.75	1.50	2.50	2.50	2.00	2.00	1.65	1.70
Cincinnati	2.00	2.00	2.00	2.00	3.75	2.50	2.85	2.46	2.14
Cleveland	2.00	3.00	2.00	3.00	3.00	3.00	2.50	2.77	2.36
Columbus	2.00	2.00	2.00	3.00	3.00	2.50	2.42	2.71	2.07
Dayton	1.75	1.75	1.50	2.50	3.75	2.50	2.29	2.58	2.00
Toledo	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Youngstown	2.50	2.50	1.00	3.00	3.00	2.50	2.92	2.92	2.39
OKLAHOMA	1.50	1.50	1.50	2.00	2.00	2.00	1.77	1.86	1.81
Oklahoma City	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
OREGON	2.00	2.00	1.50	3.00	3.00	3.00	2.19	2.38	2.07
PENNSYLVANIA	1.00	1.25	1.25	3.00	3.00	3.00	1.91	2.44	1.50
Philadelphia	2.00	2.00	2.00	2.50	4.00	4.00	2.34	2.62	2.34
Pittsburgh	1.50	1.50	2.50	3.00	3.00	3.00	2.65	2.60	2.37
RHODE ISLAND	1.75	1.75	1.75	2.75	3.00	2.00	2.07	2.21	1.90
SOUTH CAROLINA	2.00	2.00	2.00	3.00	3.00	2.00	2.33	2.33	2.00
SOUTH DAKOTA	1.00	1.00	1.00	1.75	2.50	1.75	1.45	1.75	1.45
TENNESSEE	1.50	1.50	1.50	1.75	2.50	2.50	1.69	1.80	1.69
Memphis	1.50	1.50	1.50	2.50	3.00	2.00	2.06	2.06	1.75
TEXAS	1.50	1.50	1.50	2.50	2.50	2.50	1.84	2.17	1.83
Ft. Worth	1.50	2.00	1.50	3.00	3.00	3.00	2.00	2.22	1.88
Houston	2.50	2.50	1.50	2.50	3.75	2.50	2.40	2.75	2.15
UTAH	1.00	1.75	1.75	3.00	3.00	2.50	2.10	2.28	2.10
VERMONT	1.00	1.50	1.00	2.00	2.00	2.00	1.98	1.48	1.40
VIRGINIA	1.50	1.50	1.50	2.00	3.50	2.50	1.97	2.31	1.93
WASHINGTON	1.50	1.50	1.50	3.00	3.00	3.00	2.34	2.31	2.20
Spokane	2.00	2.00	2.00	2.50	2.50	2.50	2.30	2.30	2.30
Tacoma	2.00	3.00	2.00	3.50	4.80	2.60	2.80	3.26	2.52
WEST VIRGINIA	1.00	1.25	1.25	3.00	3.00	2.50	1.83	1.81	1.66
WISCONSIN	1.25	1.25	1.00	2.00	2.00	2.00	1.73	1.88	1.55
Madison	1.50	1.50	1.50	2.50	2.50	2.00	2.05	2.05	1.88
Milwaukee	2.00	2.00	2.00	2.50	3.00	2.50	2.10	2.40	2.10
WYOMING	1.00	1.50	1.00	2.00	4.00	2.00	1.50	2.32	1.55
				CANADA					
ALBERTA	1.00	1.50	1.50	1.50	2.50	1.75	1.33	1.82	1.50
BRITISH COLUMBIA	1.50	1.50	1.50	1.75	2.50	1.75	1.51	1.75	1.55
MANITOBA	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
NEWFOUNDLAND	1.25	1.25	1.25	(only one reporting)					
NOVA SCOTIA	1.50	1.50	1.50	2.00	2.00	1.50	1.75	1.66	1.50
ONTARIO	1.00	1.00	1.00	1.50	1.50	1.50	1.42	1.40	1.21
London	1.25	1.25	1.25	2.50	2.00	1.50	1.70	1.62	1.37
Ottawa	1.25	1.50	1.25	2.00	2.00	2.00	1.54	1.70	1.54
Toronto	1.50	1.50	1.50	3.00	3.00	1.75	1.83	1.95	1.62
PRINCE EDWARD ISLAND	1.25	1.00	1.00	(only one reporting)					
QUEBEC	1.25	1.25	1.00	1.50	2.00	1.50	1.43	1.50	1.18
Montreal	1.00	1.50	1.50	2.25	2.25	1.50	1.79	1.75	1.50
SASKATCHEWAN	1.00	1.25	1.25	(only one reporting)					

Construction, Operation and Servicing (*Article Four*)

The Coldspot Electric Refrigerator

This is the fourth of a series of articles giving detailed servicing instructions on Coldspot Electric Units, compiled from the Service Manual issued by Sears Roebuck & Company, makers of the Coldspot Unit and is published with their permission. This is the first authorized publication of this material and will prove of inestimable value to the thousands of service engineers all over the country who daily come in contact with these refrigerators.

Alignment of Motor-Compressor on Unit

The motor-compressor assembly is supported on four cushion springs. If these cushion springs are not assembled properly, it is possible that the assembly may be too high or too low. If too high at the compressor end, the top of the compressor housing may touch the lid of some cabinets causing a humming or vibrating noise to be heard. If the compressor end is too low the compressor housing may touch the unit lid and cause excessive vibration.

If the fan end is too high or too low, the fan may strike the condenser housing when the motor starts.

To raise or lower either end of the motor-compressor, the cushion spring nuts can be loosened and the cushion spring plugs turned to the right to lower or to the left to raise the assembly. Tighten the nuts securely to prevent loosening by vibration.

Shipping Bolts and Blocks

To prevent damage in shipment, wooden blocks are inserted under the compressor and motor and bolts with red-painted heads are inserted in the four cushion spring assemblies and tightened on lock washers to hold the motor-compressor rigidly in place. Do not tighten the bolts too much as it is possible to bend the motor or compressor supports downward. Be sure to use the lock washers to prevent vibration from loosening the hold-down bolts *during shipment.*

If these red head bolts and blocks are left out when a unit is moved, it is probable that a refrigerant line will be broken. Always tighten them securely before moving the unit.

The bolts and blocks must be removed after the unit is in place and left in the motor compartment for future use. *The unit will be extremely noisy if the bolts are not removed.*

CAPACITORS

Two general types of capacitors have been used on Coldspot motors. The "wet" electrolytic type was used on some models and differs from the other or "dry" type in size (being larger) and the use of a liquid electrolyte instead of electrolyte-impregnated insulation between the anode plates.

The two types of capacitors are interchangeable if the mounting clamp is supplied as they are of different size for the same characteristics.

Capacitors are rated in microfarads capacity at a certain voltage. The aluminum can or the insulating top of the capacitor is usually stamped with the manufacturer's name, part number, microfarad rating, and voltage.

The rating in microfarads is sometimes given as one number, printed 75Mfd., for example, or two numbers, such as 68-76Mfd. These two capacitors so marked would be interchangeable because the single figure indicates the average capacity of the part and the double figure indicates the range of capacities (maximum and minimum). The latter marking is generally used on capacitors of recent manufacture.

The voltage and cycle rating is given as 110V, 60 cycles, or 220V, 50 cycles for example, usually stamped above or below the capacity rating (mfd.)

Diagnosing Capacitor Defects

Because the capacitor is in the starting circuit, an "open" capacitor will prevent the motor from starting. If the motor is nor-

mal, it usually hums slightly but does not turn. If the motor is given a quick spin by means of the fan, it will continue to run even if the capacitor is defective but other parts of the motor are normal.

A non-starting motor does not always indicate a defective capacitor as the starting switch or starting winding may be at fault. The simplest and most effective check is made by replacing the capacitor with one of the same rating which is known to be perfect.

A shorted capacitor will usually allow the motor to start but will pass excessive starting current which will cause sudden and violent starting.

A "weak" capacitor is one which has lost capacity and will not carry enough current for properly starting the motor under full load.

Testing Capacitors

The best method for testing capacitors is by means of a "condenser analyser" or capacity bridge. A number of types on the market are designed to test high capacities. The actual capacity of the capacitor can be found directly on such an instrument.

An effective and simple test can be made by connecting the capacitor in series with a 200 watt lamp on the 110V. AC line. If the lamp lights dimly or not at all, the capacitor is open or weak. If the lamp lights at full brilliance, the capacitor is shorted. A normal capacitor will cause the light to burn at about ¾ full illumination.

Replacement Capacitors

It is important to replace a defective capacitor with one of the proper rating. If the one on the motor is original equipment and has not been changed before in the field, the rating can be taken from it.

Electric Shocks from Unit

The most frequent cause of "stray current" in Coldspot units is a leaky capacitor. Stray current makes it possible for a person to get a slight shock if the unit is touched while the floor is damp or the person is "grounded" in any other way.

The reason for such a shock is that the line current is leaking into the metal motor frame and, therefore, into all the metal parts of the unit. The path of such leakage current is usually through the paper insulation between the capacitor can and the mounting clamp. When a capacitor has allowed some of the electrolyte to leak on to this paper, it becomes capable of carrying a small current. The remedy is to replace the capacitor *and* the paper insulation to avoid a repetition of the trouble.

COUPLINGS

Motor power is trasmitted to the compressor of open type units through a flexible coupling, Fig. 22, which consists of two flanges fitted with two pins each, and a drive washer with four holes into which the flange pins fit. The drive washer is made of cemented fabric interwoven with fine wire. The flanges may be round, Fig. 23 or oblong, Fig. 24.

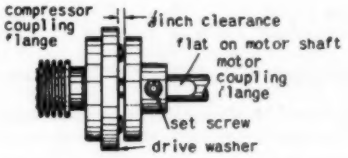


Fig. 22—Clearance for drive washer.

While this coupling is capable of acting as a universal joint between two non-concentric shafts that is not its purpose in the Coldspot. It is rather to absorb vibration of the motor especially when starting. This vibration would tend to injure the seal of the compressor. It is, therefore, essential that the motor and compressor shafts be perfectly aligned. Improper alignment is indicated by excessive noise and vibration. This is especially noticeable in non-rigid mounted units.

Coupling Wear and Noise

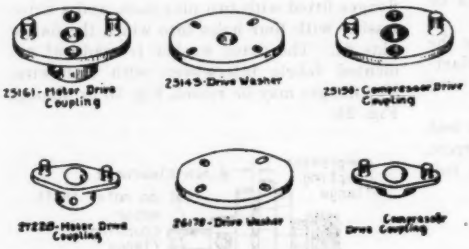
The coupling washer and flange pins on either the rigid or non-rigid connected motors must be in good condition for quiet operation. These parts may eventually become worn and require replacement even on properly aligned assemblies.

The metal wires interwoven in the drive washer become exposed if the fabric is worn away in the holes. If the worn washer is used for any considerable length of time, these metal wire ends will "chew" the flange pins and roughen their surfaces. The pitted pins then wear the washer more rapidly thus aggravating the condition.

If a unit is noisy in starting or running, the coupling assembly should be carefully inspected. If the holes in the washer are en-

larged, it should be replaced. If the flange pins are pitted or worn, the flanges should also be replaced.

Original drive washers on units tend to be harder than the replacement washers because they are painted during the assembly process. The original washers are black and the replacement washers are a natural grey.



Figs. 23 and 24—Upper views show round flanges —lower views show oblong flanges.

HERMETIC UNIT

In the hermetically sealed units, the motor and compressor use a common shaft and the entire assembly is permanently sealed in one housing, Fig. 25.

The motor in the hermetic system is a split-phase type which is hooked up in conjunction with a separate fan motor. A special relay is used with it to control the start and overload conditions.

Obviously no service operations can be performed on the compressor motor within the sealed housing. The only service corrections possible in the field concern the overload relay, and the fan motor.

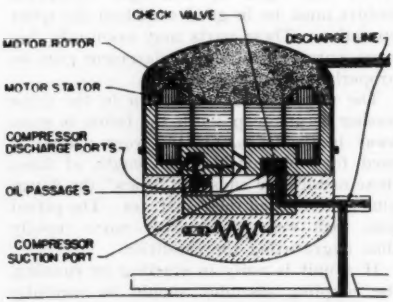


Fig. 25—Diagram of hermetic unit.

Principles of Operation

The hermetic compressor motor has two windings—starting and running (or main). The fan motor also has two windings, series and shunt. These two motors are connected in a circuit with the overload relay as in Fig. 26.

Referring to Fig. 26, it can be seen that one end of both windings of the compressor motor is connected to one winding of the fan motor. The other ends of the compressor motor windings are connected to separate terminals on the relay. Note also that the shunt winding of the fan motor is connected to the relay in parallel with the series combination of compressor main and fan series windings. The operation is as follows:

When the unit is idle, both contacts in the relay are closed. Closing the thermostat switch causes current to flow through both windings of the

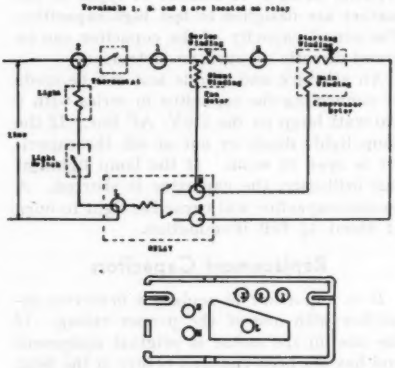


Fig. 26—Motor in circuit with overload relay.

fan motor. That part of the current which flows through the shunt winding passes through the relay to the other power wire. The current through the *series* winding of the fan motor is divided between the two compressor motor windings. The current through the *main* winding is carried by the same relay contact with current from the fan shunt winding. The starting winding current passes through a separate starting contact on the relay as shown in Fig. 29 where the two sets of contact points are described.

The starting relay also serves as an over-

load relay for motor protection purposes. The operation of this relay is given in detail in the following paragraph.

The relay starting contacts open when the starting current of the motor has flowed through the thermal wire for a predetermined length of time. The starting winding is out of the circuit when the starting contact has opened. The compressor motor main and the fan motor series windings are in series and the fan shunt winding is in parallel when the motor is running normally. The current flowing through these windings is sufficient to hold the starting contacts open.

Overload Relay

The overload relay operates by virtue of the expansion and contraction of a wire which is kept taut by a spring, Fig. 27. The thermal wire conducts all of the current

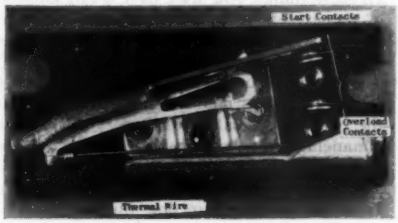


Fig. 27—Overhead relay closed.

flowing through both contacts of the relay. The tension of the wire and spring is adjusted at the factory to allow the wire to hold both contacts closed when it is cool. As a certain amount of current is passed through the thermal wire in a certain time, the wire is heated, due to the resistance which it offers, and expands to allow the spring to open the starting contacts only, Fig. 28. The amount of current required to start the compressor under normal load is known and the relay is so adjusted that

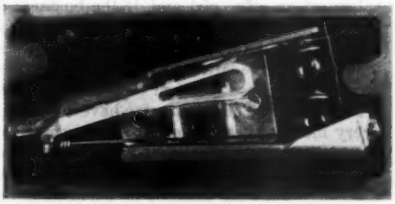


Fig. 28—Overhead relay—starting contacts opened.

the motor will have gotten up to speed before the contacts open.

If the motor continues to run under normal load, the current drawn is sufficient to

Fig. 29—Switch with both sets of contacts open. (C and S) Starting contacts. (B and M) Running contacts. (D) Moveable arm.

keep the starting contacts open but insufficient to open the overload contacts.

If the load on the compressor is excessive, if the voltage drops excessively, or if the motor windings become shorted, the additional current through the thermal wire allows the spring to open the overload contacts, Fig. 29. A link between the contact arms prevents the starting contacts from closing when the overload contacts are open.

After a minute or two, the wire cools sufficiently to allow the two contacts to close at once and the starting and running functions are repeated. If the overload condition still exists, the relay will cut out again and will continue to repeat this cycle until the overload is removed or until the current is turned off.

(To be continued in next issue)

SERVICE ENGINEER IS GOOD

THE undersigned has had the pleasure and privilege of reading your magazine in various shops over the nation during the past seven years. The information and instruction posted from your office in an effort to help the many service men with their problems in servicing refrigeration equipment receives very little written praise, although they do not hesitate to offer oral praise and worthy comment when confronted in person. This applies to operators and employees of shops both large and small whom I have personally contacted in my travels. You are doing a great job. Thanks.—*A. B. Sartin, Field Engineer, Mills Industries, Inc., Enid, Okla.*

So You Want to Get Into Business for Yourself!

By Paul B. Reed

Chairman, Wartime Educational Committee, R.S.E.S.

Mgr. Refrigeration Div., Parker Corp'n.

ARTICLE V—RESPONSIBILITY OF WORKING FOR YOURSELF

THE difference between working for wages and working for yourself is chiefly a matter of the profit on your wages that your employer makes. But to make that profit your employer has to perform certain services which, if you work for yourself, you will have to do for yourself. He furnishes the shop or place of business, keeps stock on hand, furnishes you with transportation, gets the business—the work for you to do—collects the money, keeps the records, pays all the expenses and takes the risks, all the way from you hurting someone else or yourself in an automobile accident to weathering a slack time in business by spending his good money to keep things going until business picks up. In a way, you and he are partners and should treat each other as such.

The Extras You Must Do

If you expect to go into business for yourself, you must expect to take over the services that your employer now does for you and to do them yourself. This means extra work, extra responsibility, extra liability. You will have to provide some place of business, even though it is your basement or garage, and keep some stock there—stock in which some of your money is tied up. You will have to supply and pay for your own transportation. You will have to somehow keep enough business coming in to keep you busy. You will have to collect the money, keep the records, keep a certain amount of money laid aside to pay such expenses as taxes, rent, telephone, advertising, commissions, insurance and the many other expenses incidental to running a business. And if you employ any men you must do all these things for them also. Above all, and in addition to all these things, you must have a fair amount of money left over, after all expenses, (including a salary for yourself) are paid. This money that is left over is called "net profit."

Getting the business may frequently be a tough job, but probably the hardest part for the average small business man is the "financing" which consists in balancing the income against the outgo so that there is something left—the net profit. For there to be a net profit the income must always be greater than the outgo and there are only two ways to increase the net profit—either by increasing the income (do a greater volume of business) at the same or but little greater expense; or decrease the outgo (cut operating costs).

Operating Costs

Total cost includes Fixed Expenses, such as rent, telephone, lights, power heat, property tax, insurance, interest on the money invested, (including interest on borrowed money, if any), depreciation of equipment, supplies, licenses, your own salary and the salary of an office girl and, if the business is big enough to afford them, salaries of a stock-keeper, janitor, truck-driver or a foreman and the "vacation" wages of the servicemen and shopmen. (Such salaries are "indirect labor"). These expenses have to be met every month whether you do any business or not, and are sometimes called "burden" or "overhead." Then there are the expenses that vary with the amount of business done, the cost of material, direct labor (servicemen's wages), lost time (unproductive time

spent by the servicemen in getting their material together or from the jobber, driving to and from the jobs, filling cylinders, wasted time, etc.), bad debts, sales tax, truck and car supplies, broken or lost tools, repairs, advertising, commissions on sales, freight, express and other miscellaneous variable expenses. These elements of costs are sometimes known as "Operating Expenses."

Your Overhead

Many men who go into business for themselves make the mistake of thinking that they do not have any overhead or fixed expense or that at least, their overhead is lower than that of a bigger dealer. It is, of course, less in dollars and cents, but it is likely to be greater *percentagewise*, for the bigger dealer can spread his overhead over a greater amount of business. One telephone girl can take calls for a number of servicemen and still have time to keep books, send out bills and attend to other minor details. In a large operation, the stockman can keep several servicemen supplied with parts, get the material from the jobber, uncrate and put in stock material from manufacturers, crate and ship compressors or other assemblies going back to the manufacturers for rebuilding. By so doing, he can save more than his pay in avoidance of lost time and driving expense by the individual servicemen. The big dealer, due to *increased efficiency* of operation, frequently has a lower percentage of overhead than the man who is working for himself. In determining his "low" overhead, the small operator often forgets or disregards the "lost time"—hours at night, on Saturday afternoons and on Sundays that he spent in working in his shop, making "no-charge" call-backs, getting supplies, hunting up business, sending out invoices, keeping records, paying bills, and other miscellaneous jobs.

Fallacy of Underselling

Does this mean that the small operator or small dealer can't compete with the bigger operator or dealer? Not at all! But it does mean that he will probably have to work harder and for longer hours; that he can't throw the "front" like a big dealer,—he can't have a big store, a fine display nor a big well-equipped shop, with the conveniences that the big operator has. *And above all, it means that he can't afford to try to undersell his big competitor;* not if he expects to stay in business for himself or build up his business.

Managing Your Business

It is not necessarily true that the big operator has a lower percentage of overhead than the smaller operator. The larger operator may not operate his business efficiently; he may get careless and not give it enough attention. Few businesses run themselves; they must be watched to avoid waste and loss of good will.

Much depends upon how the dealer or service operator conducts his business whether it be small or large. A well-managed, efficiently operated small business can easily have a lower *percent* of overhead and operating cost and a higher *percent* of net profit than a poorly managed, inefficiently operated big business.

Here is another way of looking at the same problem. Suppose that you charge at a rate of $2.00 per hour. If you worked (for yourself) 50 hours per week you would take in $100 per week. But the chances are that you do not actually put in more than 40 hours in productive labor; that is, labor for which you can charge the customer. You lose time going to supply houses, estimating jobs, making collections, making "no-charge" call-backs. So actually, you may collect only $80.00 per week on your labor. Then out of that must come expenses which may run as high as 40 to 50 percent of the total income. So you are down to $45.00 per week or less. And this is based on the supposition that you will keep busy the year around or at least average 40 productive, charge hours, the year around. Of course, you will make some profit on the supplies and parts you use.

A business is just what you make it. If you manage well, have a good class of customers, plenty of business, work long hours (probably *average* over 60 hours per week) and most important if you know your job and can diagnose trouble quickly and correct it with very little delay, you can make as much as $75 to $100 per week working for yourself. But if you work only 40 to 50 hours a week total, waste a lot of time, lose time trying to find out what is wrong with a job, have to do your work over again and lose the confidence of your customers, you won't make much money as an independent service engineer. Some men work best under supervision; they are incapable of driving themselves.

Importance of Advance Planning

Businesses cannot be run on a hit-or-miss, day-to-day method. Like military campaigns they must be planned in advance and, insofar as possible, in detail, leaving no more than necessary to chance or last minute decision. The plan is called a "Budget." It is a carefully worked out forecast of what the business is expected to do within the following year. Unless it is broken down into detail, it is worthless. It should be the result of a good deal of study and it should not be lightly arrived at. Then after the Budget has finally been compiled, *it should be followed.* There is no use having a plan, a Budget, unless it is followed. It tells you what you can do and what you can't afford. For example, you may have several hundred dollars in the bank and it occurs to you that it would be nice if you had some new office furniture or a new machine in the shop. Your first question should be, "Will it make enough more money for me to pay for itself in five years and make me more money besides?" And then, "Will the Budget stand it?", that is, "Can I afford it?" If it won't pay for itself and give a profit besides, then it isn't good business and it should be passed up, even though you have money in the bank. You may need that money later to tide you over a period of bad business or to enable you to take advantage of an unexpected good opportunity. Even though it seems that it will pay for itself, and yet it's cost would drain you of your reserve capital, you might find it would be wise to pass it up for the time being at least.

The good businessman has to be quite cold-blooded about such matters. He must learn to distinguish between what he *wants* and what he *needs;* what he would like to do and what will make him money. On the other hand, he must not confuse "good business" with over-caution. There are times and circumstances that require venturesomeness—a willingness to take chances if the rewards are high and if the chances are justified by good judgment—by logical analysis, rather than by emotional desires.

Establishing a Budget

If you have never operated on a budget nor kept records that enable you to know where and for what your money is being spent, your first budget will probably not be very accurate in details, but as your record and accounting methods improve, you will be able to build a more accurate and more detailed budget that will be of increased value to you. Do not be discouraged with your first one or two budgets.

The twin brother of the budget is the monthly statement. The budget tells what was expected; the statement tells what actually happened. By comparing the two you can discover where you erred in the budget or perhaps for what you spent money that was not provided in the budget, so that in the future, you can more accurately plan your budget or take precautions to hold your costs in line. Moreover, the budget and the statement must be broken down into the various elements of income and cost. It does little good to simply predict, "This month I'll do about one thousand dollars worth of business and I'll make about $400" even though at the end of the month you appear to have made $450. Perhaps you didn't take all your costs into account. Did you take out for a twelfth of the insurance on the truck or a months interest on the money you have invested in shop, tools, truck, "accounts receivable" (money due you), bad accounts, or a note you have at the bank? And did you take out for depreciation of the truck and shop equipment, breakage and loss of tools, replacement of tires, repairs to the truck, etc., etc., etc.? After figuring in all of those things you may find that you had only $300 left instead of $450.

Not All Profit

But the $300 still isn't "profit." You haven't figured in your own salary. How much could you get working for someone else,—$60 a week? That's about $250 per month. So you find that you only made an *actual* profit of $50 that month. In other words, you made $50 more that month than if you were working for someone else. If you average that same amount throughout the year, your *net* profit for the year would be $600. If you did $12,000 worth of business that year your *net* profit would be at a rate of 5% (600 ÷ 12,000) which is a rather low rate of net profit. Most businesses try to make at least 10% net profit.

It is beyond the scope of this article to cover all the details of setting up a budget and keeping records that will allow you to make up an operating statement. Any good public library should have books on accounting and budgets. The budget should be made up for at least 6 months ahead, say

(Continued on page 52)

Selecting Evaporator and Condensing Unit[1]

By D. D. Orr[2]

THIS paper deals with the proper method of selecting an evaporator for a given refrigeration system and then the selection of a condensing unit which will make the system deliver the desired results. The rule of thumb, or guess system, is not satisfactory and often gets the refrigeration man into needless difficulties. By using an evaporator-compressor balance sheet—which is really very simple—these difficulties can be avoided. Many of you may be familiar with this procedure, others probably are not.

Selecting Evaporator Type

When selecting equipment for a job the evaporator is always selected first. The reasons for doing this will become apparent as we go along. The first thing to consider is the type of coil which should be used. For temperatures above freezing where it is possible to operate on a defrost cycle, the finned coil is the best. If our temperatures are to be below freezing, we will use either a bare pipe or a plate type coil. If the cooler is subject to high peak loads and space is limited, the forced convection coil will be the best type. The forced convection coil will also give better humidity control. Many forced convection coils have variable speed fans which control the volume of air over the evaporator thus making it possible to maintain almost positive humidity control. There are other things which might influence coil selection, but for the purpose of this discussion, I will not try to enumerate all of them.

Coil Capacity Factors

You are all familiar with the way coils are listed in catalogues. We find that coils of certain dimensions have certain B.t.u. capacities if operated at the specified temperature difference. Let's consider what governs the capacity of a coil. We are given a very simple mathematical formula which states that $H = AxKxTD$. If we analyze this formula, we find that (H) is the capacity of the evaporator, and since there are factors which cause the evaporators capacity to vary it is not a constant quantity. (A) is the area of the coil expressed in square feet. If the coil is of the finned type, the area of course includes both the bare pipe and the fins, called the primary and secondary surfaces. The area of the bare pipe coil needs no explanation. The area of the plate coil is both sides of the plate provided both are exposed. Since it is impossible to change the size of the coil, (A) is then a fixed quantity. (K) is the co-efficient of heat transfer, and is expressed as the number of B.t.u. per hour, per square of surface, per degree of temperature difference that will be absorbed by the coil. Theoretically, (K) is a fixed quantity. There are certain conditions affecting (K) which I will take up later. (T.D.) is the difference in temperature between the refrigerated space and the refrigerant in the coil. It is a variable quantity. From this analysis we see that the only way to change the capacity of a given evaporator is to vary the T.D. There is another term with which we should become familiar; it being the "Basic rating" of the coil. Often coil capacities are not given for the temperature difference at which they are to be operated. It then becomes necessary to find the capacity at the desired T.D. This can be done by first finding the basic rating which is its capacity for one degree of T.D. Thus, if an evaporator is listed as having a capacity of 10,000 B.t.u. at 20° T.D., by simply dividing 10,000 by 20 we find the basic rating to be 500 B.t.u. per hour. Then if it is desired to operate at 15° T.D. the capacity will be 500x15 or 7500 B.t.u. per hour.

Temperature Difference

The correct temperature difference at which coils should be operated depend on the type coil, and also on humidity conditions desirable for the installation. Common practice seems to dictate a T.D. of between 15 and 25 degrees on natural convection coils. It is best to hold the T.D. at from 10 to 15 degrees or even less on forced convection coils. Plate type coils should operate at about 13 or 16 degrees of T.D. provided

[1] Paper presented to Chicago Chapter, R.S.E.S.
[2] Educational Chairman, Chicago Chapter, R.S.E.S. Refrigeration Engineers, Herman Goldberg Co.

they do not contain an eutectic solution. With the plate type coil using an eutectic solution we actually have two temperature differences to consider; namely, the difference between the refrigerated space and the eutectic solution, and between the solution and refrigerant in the coil. As an example, if the difference between the refrigerated space and the solution is 15° and the refrigerant in the coil is 15° colder than the solution we actually have a temperature difference of 30°. This is an important factor since the low refrigerant temperature will greatly affect the capacity of the condensing unit.

With these preliminary remarks let us construct an Evaporator-Compressor Balance Sheet. As can be seen the balance sheet is merely a graph which shows two columns on the left. Since the T.D. and refrigerant temperatures are expressed in the same units, that is degrees, the two columns will be labeled T.D. and °F. On the outside column we start at zero and number down, this always remains the same. The inside column varies according to the temperature desired in the refrigerated space. Therefore, we start numbering with the temperature desired in each particular case. As an example, if we desired to maintain a 40° temperature and operate our evaporator on a 20° T.D., we would start numbering our second column at 40° and number down. Thus if we located the point on the graph it would be found our refrigerant temperature at 20° T.D. would be 20°. The vertical lines in our graph are given a value in B.t.u. With a chart thus constructed it is now easy to show graphically what happens to evaporator capacity as the T.D. varies, and what happens to compressor capacity as the suction temperature varies.

Selecting the Evaporator

Now let us assume an actual refrigeration problem. We will assume that the load has been calculated and found to be 100,000 B.t.u. daily. Let us further assume that we are using a finned coil which we will operate 16 hours daily, and that we wish to operate at 20° T.D. First it becomes necessary to find the hourly load, which can be done by dividing the total load by the number of hours operation. It is also advisable to add about 10 per cent as a safety factor. Then if we divide 100,000 by 16 and add 10 per cent we find our hourly load to be 6900 B.t.u. It then becomes necessary to select a coil from the catalogue having the correct physical size and shape with a capacity of 6900 B.t.u. at 20° T.D. We can now plot a curve on the graph which will show the capacity of the evaporator at various temperature differences. Since the capacity is 6900 B.t.u. at 20° T.D., its basic rating is 6900 divided by 20 or 344 B.t.u. per hour. Its capacity for 10° T.D. would be 3440 B.t.u. and at 25° T.D. 8600 B.t.u. Using these two points on the graph as a basis, we can then plot the curve which is a straight line and can be extended in either direction as far as necessary.

Condensing Unit Selection

After having established the evaporator curve, and the temperature difference at which the evaporator is to operate it is possible to plot the condensing unit curve. Condensing unit capacities are listed at given suction temperatures for the kind of refrigerant used. As was previously stated, it is necessary to select the evaporator first in order to establish the suction temperature at which the machine will operate. In this case we are to maintain a 40° box temperature, and the evaporator is to operate at 20° T.D., therefore, the suction temperature will be 20°. Assuming this job will use Freon-12 as the refrigerant, by consulting one manufacturer's catalogue we find a ¾ h.p. air cooled machine with a capacity of 6900 B.t.u. at 20° suction temperature. In order to locate two points on the graph to plot the curve we find at 10° suction temperature the capacity of the machine is 5360 B.t.u. and at 25° it is 7680. Again taking these points we can plot our curve and again extend the line as far as is necessary in either direction. This machine is compressor A shown on the balance sheet.

If the point at which the two lines intersect is observed, it will be found balance is at the point desired. There is always a point at which a balance is reached as the evaporator capacity is equal to the compressor, or vice versa. Therefore, it is exceedingly important that this balance occurs at the desired point.

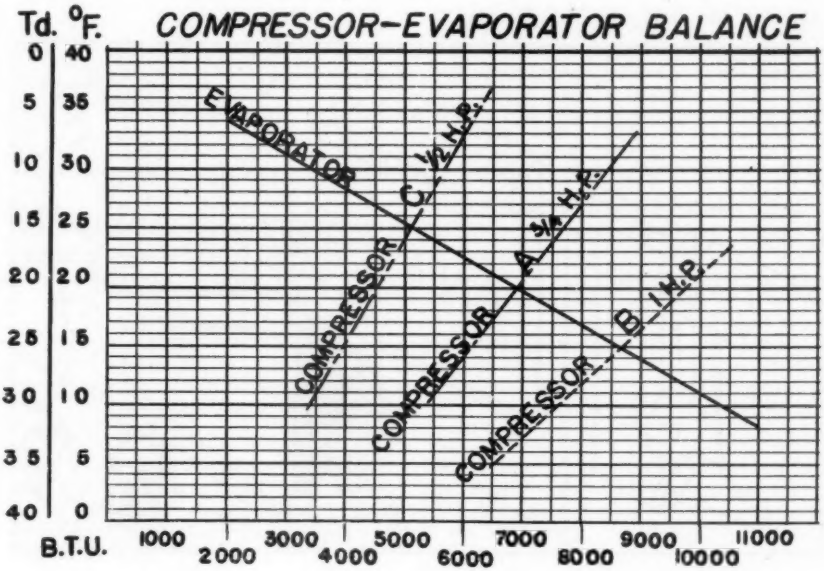
It is interesting to note what would happen if an undersized and an oversized condensing unit was used on this same coil. Compressor B represents an oversized unit. This unit has a capacity of 6580 B.t.u. at 5° suction temperature, and 9750 B.t.u. at 20°. Again using these two points to plot the curve, we find balance occurs at approx-

imately 25° T.D., and the capacity of the system is about 8650 B.t.u. per hour. Compressor C represents an undersized unit. This unit has a capacity of 3460 B.t.u. at 10° suction temperature and 5080 B.t.u. at 25°. Again using these points to plot the curve, balance occurs at about 15° T.D. and the system's capacity is about 5100 B.t.u. per hour.

Improper Balance Troubles

If an analysis of the incorrect equipment is made many problems are suggested. It is important that the service engineer be able to recognize these problems in order to render his customer the best possible service. Too often service calls are not the result of mechanical failure, but rather in original design. It will be noted in the case of compressor B, the T.D. increased 5° in order to make evaporator balance, and that the system's capacity is about 1750 B.t.u. over the estimated hourly load. When the T.D. is increased due to the coil being too small in proportion to the machine, the running time is decreased and a low relative humidity will result. In this case the running time would be reduced to 11.6 hours per day instead of desired 16. This figure is determined by dividing the estimated load by the system's capacity times the desired number of hours of operation. Then the problem is set up as follows: $\frac{6900}{8650} \times 16 = 11.6$. The decrease in relative humidity is, of course, due to the lowered refrigerant temperature which causes excessive frosting of the coil. It can be seen from this analysis the customer might complain that the machine short cycles, the products dry out, and that the coil frosts excessively, none of which would be due to mechanical failure.

Compressor C is too small in proportion to the size of the coil. Here the T.D. is decreased to about 15° and the system's capacity is about 5100 B.t.u. which is 1800 B.t.u. less than the estimated hourly load. The running time would be increased to handle the load. Using the same method of estimating the running time as was used in the case of compressor B, it will be found that: $\frac{6990}{5100} \times 16 = 18.5$. Instead of 16 hour operation we have 18.5. It will also be found that there is an increase in relative humidity. The refrigerant temperature is still below 32°, so it is possible to have an icing condition on the coil due to the fact that there is insufficient time to allow for a defrosting cycle.



Frost and the K Factor

In the discussion thus far, the ideal equipment condition has been assumed. As was stated in the beginning there are conditions affecting (K) which in turn vary the capacity of the evaporator. Some of these conditions which the service engineer should recognize are the condition of the outside of the coil, the condition of the inside of the coil, and the condition of the fins. Excessive frosting of the coil, a foreign matter, such as dirt, tend to reduce the (K) factor. There is one exception to frosting of the coil being undesirable, that being in the case of a bare pipe coil. This is also the exception to the statement that the area of the coil is a fixed quantity. As frost builds on a bare pipe coil, the increase in area more than offsets the loss in K, a condition on the inside of the evaporator which would affect K is "oil logging." The oil acts as an insulator thereby reducing the rate of the transmission. If there is not a good bond between the fins and the tubing a loss in K is the result. This could be caused by a breaking away of the solder in case the fins are soldered to the tubes. When forced convection evaporators are used the velocity of air over the coil will affect the K factor.

Conclusion

It should be understood that in order to obtain desirable operating and humidity conditions the evaporator must be selected which will operate at the desired T.D., and the compressor must be selected which has to correct capacity at the selected operating suction temperature. If a compressor is not available which has the right capacity a slight variation may be obtained by changing its speed. It is not advisable, however, to speed up the compressor too much, as there is danger of overloading the motor. After the equipment has been installed periodic inspections should be made to make sure none of the conditions exist which will affect the K factor, that is the rate of heat transmission in the coil and as a result, the overall capacity of the system. The compressor can handle no more heat than is absorbed by the coil and the coil can absorb no more heat than the compressor can pump. Therefore, regardless of the size of coil and compressor in any system, the two are always in balance.

That's Jones; he's made a little money in refrigeration service the last couple of years

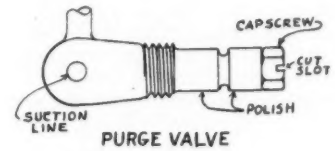
SERVICE POINTERS

Practical Solutions of Your Service Problems

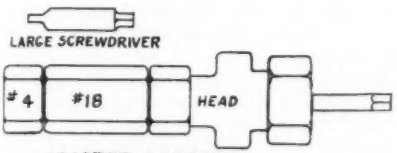
EDITOR'S NOTE: Here are additional contributions submitted in the Service Pointers Contest. Others will appear in the next and following issues.

SERVICE VALVE FOR WARD UNIT

WHEN called to service the Montgomery Ward Hermetic, it will be found that no adapter is in the Hermetic valve kit. It is possible to make the No. 4 Imperial adapter or the large screwdriver adapter work. To make the connection, first polish the long neck of the purge valve with emery cloth, then wash clean with a solvent. With a fine tooth hacksaw, cut two slots 3/32 inch wide and 3/32 inch deep across the top of the cap screw and neck of the valve. File until the fitting will screw on the threads of the purge valve without binding. Remove No. 4 adapter and assemble to adapter No. 18 using a copper gasket between them to prevent leakage.



PURGE VALVE

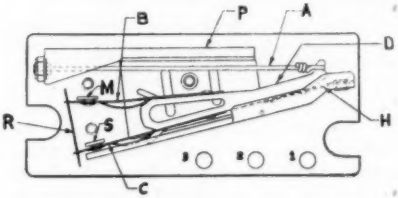


ADAPTER ASSEMBLY

Install this assembly on the purge valve without a washer on No. 4, using a small amount of Permatex on the threads instead. Insert the large screwdriver purge wrench and attach the gauge body. Before assembling to the valve, loosen the cap screw purge with a good wrench to avoid damaging. Make the final tightening after removing the Hermetic purge assembly. *Submitted by Wilbur O. Watkins, Henderson, Nevada.*

ADJUSTING HOT WIRE RELAY

FAILURE of the Delco hot wire relay is often the result of the "hot wire" lengthening from repeated expansion and contraction. Emergency adjustment can be made on the job by putting a slight kink in the "hot wire" with a pair of thin nose pliers.



Disconnect the electric current at the wall receptacle, then carefully kink the wire only enough to get the proper operation. Tests can be made by starting the motor and noting the time required for the starting circuit to open. These contacts should open in less than three seconds. When the machine has run for a few minutes, turn it off and without allowing the pressures to equalize, start the motor again. If the relay opens the main circuit in less than two seconds, proper motor protection is assured. I have repaired many relays in this manner and find them to be very satisfactory. *Submitted by Elmer L. Fair, F-1/c, U. S. Navy.*

S S S

COLDSPOT NOISE ELIMINATION

I HAVE had several calls on Coldspot refrigerators that were noisy and would not freeze. I am under the impression that the oil leaves the compressor and lodges in the receiver and evaporator. Here is how I have corrected the trouble.

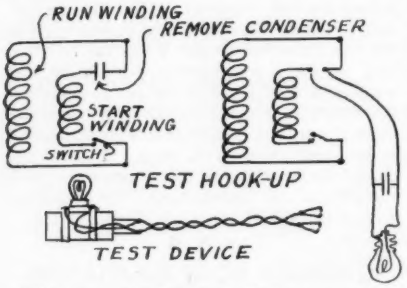
Open the expansion valve by turning the adjustment all the way in. Be sure to count the number of turns this requires so the valve can be adjusted to its original setting without putting a gauge on the low side. Permit the unit to run for about five minutes and the evaporator will begin to sweat. Gradually close the expansion valve while the machine continues to run and note that the evaporator continues to get colder and the

unit becomes less noisy. Continue to reduce the suction pressure by adjusting the expansion valve every few minutes. This will generally be 2½ turns from the wide open position. As the evaporator begins to frost, the suction line will frost back to the compressor. Let the unit run for several minutes with a frosted suction line to carry back any oil in the evaporator that may be free or in solution with the refrigerant.

The final operation is to reset the expansion valve at its original adjustment. Note the defrosting of the suction line and normal running noise. During this operation ice cube trays should be removed.—*Submitted by Anthony Fama, Plaquemine, La.*

CAPACITOR MOTOR TESTING DEVICE

A CONVENIENT capacitor motor testing device can be made from a variable condenser and low wattage lamp as illustrated. Connect a pair of flexible insulated wires to the light socket and connect the two variable condenser leads in parallel with the light. Attach small insulated clips to the wire terminals. The light socket can be taped directly to the side of the condenser.



When a motor is to be tested, remove the condenser and connect the test device across the two lead wires from the motor. To determine the proper mfd. rating for replacement, adjust the test condenser until normal starting time is accomplished. When the centrifugal switch is working properly, the bulb will light on starting the motor and go out immediately. If the switch fails to open after the motor is up to running speed, the light will remain on.

The condenser and light for testing must correspond with the voltage being used on the motor. I secured the variable condenser from a supply company. *Submitted by Everett Gardner, Pendleton, Ind.*

GRUNOW MOTOR AND STARTER TROUBLE

IF THE motor will not start automatically but can be started by raising the solenoid by hand, the trouble usually is a partially open rotor. A rotor that is open still more may run as long as the starter contact is closed and then quit running when the running winding only is energized. Silver solder makes a better rotor repair job than lead-tin solder. A temporary solution for a partially open rotor is to adjust the solenoid, so that it does not have so far to travel, by putting a block of wood under it. Sometimes this seems to be the only solution.

If the starting relay stays up all the time the current is on, the stator winding usually is damaged, burned out or shorted. A burned out stator may have been caused by "old age" or high voltage but the chances are that moisture and high head pressure have caused it to burn out. When replacing a burned out stator, clean the system, especially the condenser, and check for leaks. While the unit is in for shop repairs, it is a good idea to saw off the 3/16 inch condenser discharge pipe, blow out the condenser, and install a ¼ inch condenser discharge pipe.

Sometimes a rotor will be found that does not have the same taper as the compressor shaft, causing the rotor to drag on the stator. A tin foil shim will correct this without lathe work. A ⅓ h.p. Hotwire motor starter relay and an 80 mfd. condenser in the starting winding lead, works fine on a Grunow as a replacement for the starter mechanism.—*Submitted by C. L. Carter, Pueblo, Colorado.*

CHANGING TO EXPANSION VALVE ON WARD UNIT

I RECENTLY was called to service a Montgomery Ward refrigerator with a Frigidaire unit that had the high side float removed and an automatic expansion valve installed. The receiver shut-off valve would frost, indicating a restriction at that point in the circuit. As a first step the receiver was blown out with carbon dioxide gas.

This did not correct the trouble so the receiver was removed and the valve taken off. After removing the valve screen, it was discovered that the holes through these valves are very small. By drilling the hole to 1/16 inch diameter and replacing the valve after thoroughly cleaning the receiver, the system immediately went to work without further difficulty. *Submitted by Cecil D. Rodgers, Kingsville, Texas.*

QUESTIONS AND ANSWERS

On Problems of Servicing, Installation and Maintenance of Household and Commercial Refrigerating Equipment—Send Your Problems to the Question Box.

MORE INFORMATION ON QUESTION NUMBER 641

The first thing to do to a Norge C/M refrigerator is to purge all gas and remove the compressor, drain the oil from same and recharge with 24 oz. Norge Sulphur oil. Next it is necessary to unsolder the loop of the capillary tube, which is soft soldered to the ice cube shelf, and place it in the back of the evaporator. This can be done with a torch, using a piece of drill rod with a blunt screwdriver point to pull the capillary tube down as you unsolder it.

Pull a vacuum in the entire system after reassembling, and charge with SO_2 using no F-12. The C/M system originally held around 2.2 pounds of SO_2 and 2 ounces of F-12, so in recharging use about 2¼ pounds of SO_2 and adjust the system the same as any hi-side float system.

The only actual trouble with the C/M system is that the above-mentioned capillary tube is soldered to the coldest part of the system, and oil trying to pass through this portion of the tube, would congeal and stop the flow of the liquid refrigerant.—*Arthur A. Hughes, Ft. Wayne, Ind.*

DEAD SPOTS IN R. I. MOTORS

Question 651: We are trying to do minor repair work on small R. I. motors in our service shop. Lately we find a number of returns due to dead spots. Do you know of any quick way to test a motor before it is delivered to the customer or what tests to make when they are brought in defective?

Answer: I am sorry that we do not have any publications on repairing of refrigerator motors. We have had several articles dealing partially with the subject in past issues of The Refrigeration Service Engineer, but since you are a subscriber, I assume that you have these in your file. McGraw Hill Book Co., 330 W. 42nd St., New York, N. Y. publish several books on the repair and rewinding of small motors and I believe if you will write them, you will be able to obtain the information you require.

Your description regarding the trouble you are experiencing in these motors, leads me to believe the dead spots are due to improper contact between the commutator segments and the short-circuiting device. Usually this sort of trouble can be due either to poor short-circuiting contact or to open circuit at the individual coils. The short-circuiting contact, however, is more often the cause. It is necessary in most cases to machine the surface on the commutator where the short-circuiting device makes contact, and if the short-circuiting ring or necklace, as it is sometimes called, is pitted and burned, it is best to replace it with a new one.

DELPHOS PARTS NOT MADE

Question 652: I have a customer that has a locker plant and a chill room that operates from two ice machines.

These machines were made by The Delphos Ice Machine Co. at Delphos, Ohio. The manufacturer is out of business and I have been unable to locate any repairs for these machines. Valves and piston pins are the parts that are in need. Please inform me where I may locate these repairs.

Answer: We have been unable to locate any firm who handles Delphos Ice Machine Company parts. Apparently, this company has been out of the business so long that no parts are available. We suggest you contact J. H. H. Voss Company, 785 E. 144th Street, New York, N. Y., for replacement valves. Voss valves are designed for many makes of machines and it is just possible that one of their many designs will work in the Delphos Compressor.

Standard piston pins may be obtainable from either York Corpn., Vilter Manufacturing Company, or Frick Company, by giving them the bore of the cylinder and diameter of the piston pin.

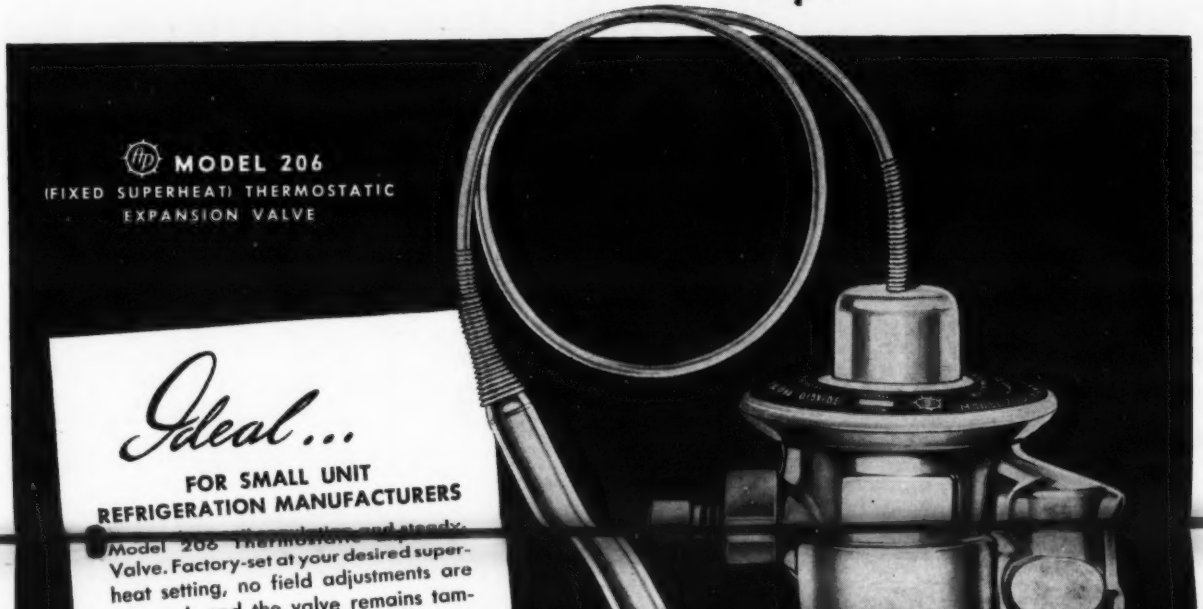
The only data we have is of a general nature. Four model numbers are given in the Delphos Bulletin, published by the Company in 1924. These are:

D-50 ¾ Ton—Single Cylinder 1½ H. P. 3″ bore x 3¼″ stroke; D-1 1 to 1½ ton—2 Cylinder 3 H. P. 3″ bore x 3¼″ stroke; D-2 2 to 3 ton—2 cylinder 5 H. P. 3½″ bore x 4¼″ stroke; D-4 4 to 5 ton—2 cylinder 7½ H. P. 4⅛″ bore x 4¼″ stroke.

The piston valves are in retainer cages.

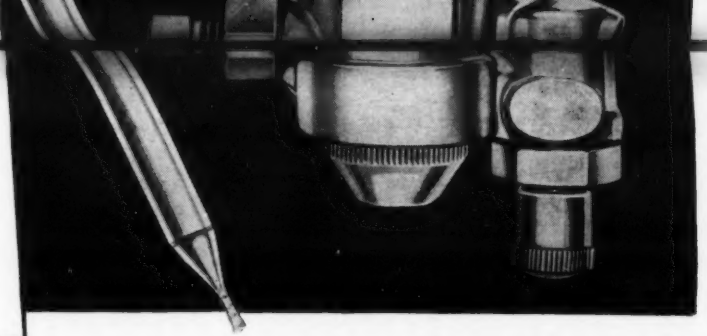
Dependability doesn't happen...

IT'S *BUILT INTO* EVERY fp VALVE



REFRIGERATION MANUFACTURERS

Model 206 Thermostatic Expansion Valve. Factory-set at your desired superheat setting, no field adjustments are required, and the valve remains tamper-proof. Built under rigid factory inspection — with all parts microscopically examined and thoroughly tested during and after fabrication. Install Model 206 with full confidence in any application where the superheat setting has been predetermined.



Wherever a non-adjustable expansion valve is required, or preferred, the A-P Model 206 is best. Absolutely reliable and dependable, it maintains a constant superheat over a wide range of evaporator temperatures — a real advantage in this type of valve. Its maximum capacity — 0.61 tons Freon; 1.32 tons Methyl or Sulphur.

AUTOMATIC PRODUCTS COMPANY

2454 North Thirty-Second Street • Milwaukee 10, Wisconsin
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DEPENDABLE
REFRIGERANT VALVES

Stocked and Sold by Progressive Refrigeration Jobbers Everywhere — Recommended and Installed by Leading Refrigeration Service Engineers.

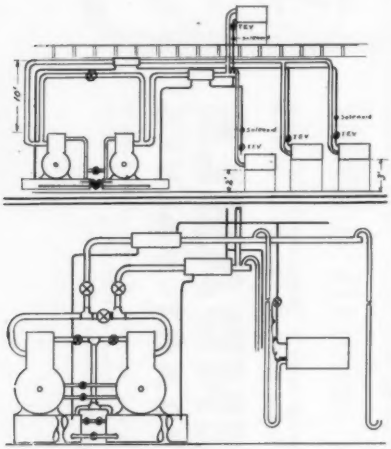
NOTE THESE FEATURES...

- ★ Liquid cross-charged for maximum efficiency
- ★ Three orifice sizes
- ★ Built-in Strainer 1.23 sq. in.
- ★ Small size for hard-to-get-at applications
- ★ Factory-set superheat 10; 5 to 15 degree available range
- ★ Free acting diaphragm

The spring retaining nut is welded to the stem after being set properly to give correct spring tension. The discharge valves are cup shaped castings. They are seated in safety cages which, in turn, are ground to accurate seats on top of the cylinder castings.

OIL PROBLEM IN MULTIPLE UNIT INSTALLATION

QUESTION 653: The accompanying sketch (upper) shows an air conditioning system which has been a source of trouble to us. While the machine is running, the oil gradually disappears from the compressors. These compressors are equipped with sight glasses. When additional oil is added, it remains for ½ to ¾ hour of operation; then gradually leaves the compressor crank cases.



If the compressors are turned off for a few minutes then put in operation, the oil returns and fills the crank cases to above normal. After several hours idle, they slug oil terrifically on starting up again. The cylinders, pistons, and rings are in excellent condition. Please advise us what to do to overcome the trouble.

ANSWER: An analysis of the installation you are having trouble with leads me to believe there are several things that might be causing trouble. In the lower diagram, I have made the recommended changes in the system.

Where the evaporators are below the main suction line, each individual suction line should come out of the coil and drop down a foot or more, then pass up to the main. This will form a U bend where the oil will be collected and ultimately be carried up the riser by the velocity of the suction vapor. In order to get the oil to rise, it will also be necessary to have the proper size risers to maintain gas velocity sufficient to carry the oil. All suction risers should be teed into the main at the top or side and never into the bottom. I would suggest that you contact the manufacturer for recommendations as to suction line sizes from each evaporator, suction lines, and manifolds.

The discharge lines from the compressors should be manifolded and teed into a common line leading to each condenser. The other equalizer lines as you have shown them are in keeping with good design. The two compressor crank cases should have an equalizer line at the oil level and another equalizer line above the oil level. The suction line connecting the two compressors as you have shown can be eliminated when the compressors are connected into a suction manifold.

Oil separators will also prevent circulation of the oil through the system. If oil separators are installed, they should have the gas outlets manifolded and leading into common discharge line to the condensers. The oil return to the compressors should be teed into the equalizer line about half-way between the compressors to give the gas a chance to escape from the oil before entering crank cases. When you get the system operating correctly, it may be necessary to remove some oil to keep the oil level down to normal.

CHANGES FROM SO_2 TO METHYL

QUESTION 654: Can a condensing unit designed for SO_2 be changed over to methyl chloride without any changes in the high-side?

ANSWER: It is not advisable to change a unit from SO_2 to methyl chloride without first dismantling the compressor and cleaning each part. The condenser and receiver should also be thoroughly cleaned inside to eliminate all foreign substance and oil that is present.

Changing to methyl chloride increases the capacity of the compressor; therefore, the motor may be overloaded unless a smaller motor pulley is used.

Another important thing to remember is the reaction of methyl chloride on aluminum parts. Be sure no aluminum is used where it will come in contact with this refrigerant.

Servicing The Mills Freezer

By A. B. Sa.tin
Field Manager, Mills Industries, Inc.

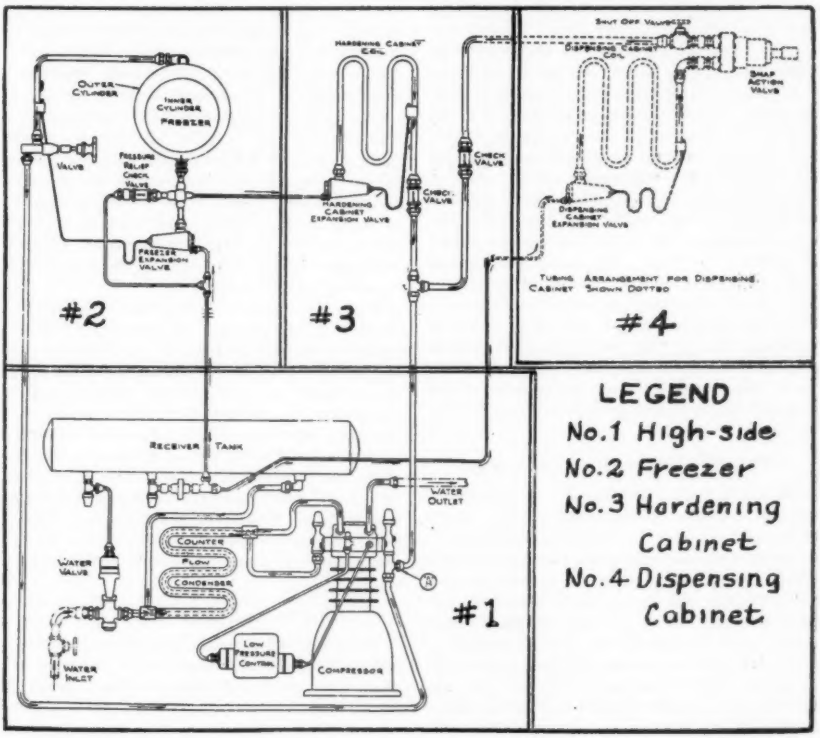
EDITOR'S NOTE: To assist service engineers in the servicing of Mills ice cream freezers and dispensing cabinets, the author presents suggestions prompted by question 639 appearing in the *Question and Answer* department of the January issue.

THE following explanation of the Mills freezer is very similar to instruction in training given to Mills authorized servicemen, prior to the present war condition. Should this information prove of value to any serviceman in need of further information, the author and service department of Mills Industries, Inc. will consider the effort not in vain.

The accompanying diagram shows the system divided into four parts. Part 1 includes the remote condensing unit and attached accessories. Part 2 represents the freezer head and necessary accessories. Part 3 shows the hardening cabinet refrigerant circuit. Part 4 includes the dispensing cabinet, snap-action valve and accessories.

Preparing to Remove Moisture

In approaching the problem of servicing this system when moisture is present, the following steps are recommended:



First, the cabinet is allowed to rise in temperature, well above 32° F., to release moisture within the coils. This moisture having been in the form of ice globules within the coil during the low temperature operation may have been caused when changing expansion valve with cabinet coils at low temperature.

Second, the complete system is pumped down and the refrigerant discharged from the liquid line service valve at the receiver to assist in removing moisture from the condenser and receiver, in addition to eliminating fire hazard by disposing of refrigerant to open atmosphere outside of building and not in the presence of open fires. The water first must be blown from the tube in tube condenser, or condenser receiver, to avoid freezing and expansion when refrigerant is released. Third, the complete system is first checked for leaks and the leak or leaks located so that proper repair can be made.

We assume that every serviceman understands the possibility of a leak at various points of the compressor body, compressor service shut off valves, etc. Obviously, all other sweat and flared fittings on the low side of any system present a possible source of leaks. In particular do not overlook the hand shut off valve at the freezer head, this valve must be open to permit pressure on the sylphon or diaphragm when leak detector test is made. Another location often overlooked is the sylphon within the snap-action valve located in the suction line of the dispensing cabinet. To thoroughly check this valve for leak it is necessary to remove the rubber cap (the valve must be installed with cap upright, not on side or in inverted position) and remove the knurled nut (cut-in adjustment) from the topmost part of the valve, this permits the exploring tube of the detector to be placed into the valve to check the valve sylphon.

Possible Entrance of Moisture

Should a leak exist at any of the above named locations the following result can be expected. At first the compressor will carry a slight, above normal head pressure, due to air in the system. Within a short time the water valve will stand open, although the unit is on *off cycle* and an excessive water supply will feed while the unit is operating. Next, the moisture formerly contained within the air will freeze out of the refrigerant, usually causing the restriction to take place in the T.E.V. orifice.

On other units, using a water cooled compressor head, it is possible to draw moisture into the system without a rise in head pressure. This can be due to a crack on the suction side of the head plate, usually brought about from freezing or misuse. This can be easily understood since the compressor is set with Pressurestat to cut-in at zero pounds and cut-out: 17 to 18 inches vacuum. A like condition can exist should a leak occur on an open coil covered with ice.

Cleaning and Drying

We are now ready to wash out the low side circuits in each of the cabinets. Remove all valves and accessories from coil connections. Use carbon tetrachloride as cleaning solvent making use of carbon dioxide as source of pressure. To properly wash the coil and remove the solvent it will be necessary to allow the pressure from the CO_2 drum to build up within the coil slowly. This is easily accomplished by the use of a pressure regulator and gauge on the CO_2 drum. With your thumb over one end of the coil it is possible to obtain a coil pressure of approximately 125 pounds. Remove your thumb or other used obstruction hastily to permit a rapid release of pressure. This causes the solvent to flow or drift through the coil, otherwise the pressure passing over the solvent, located in low points and bends would only cause a surface ripple or equivalent. Continue to wash and blow coil until the vapor-gas mixture of carbon tetrachloride and CO_2 escaping from the coil feels dry to sense of touch.

Follow the same procedure in washing the freezer head, keeping in mind the barrel within a barrel mechanical construction of the head. Due to its construction it will be necessary to wash and blow the head with the source of pressure connected to what is normally the suction line. The disposal will be located at the bottom of the freezer head. Since all expansion valves, check valves, snap-valve, etc. are removed before starting to blow the coils, freezer head, etc., these removed parts can be taken to the shop, along with the condensing unit for cleaning and checking.

Valve and Bulb Location

The Model 30 Freezer, including the Model 402 or Model 403 Dispensing Cabinets were originally equipped with Detroit valves, Model 673, having a 5/64 inch orifice, 20 pounds limiting back pressure, using methyl

chloride. It is advisable to double check the freezer head making certain that this type of valve is used at this particular point, otherwise long freezing period is inevitable. The cabinet is constructed in the manner as described in January 1945 issue of THE REFRIGERATION SERVICE ENGINEER. As explained the expansion valve is located on the operator's side and a search will disclose the location of a bulb-well built into this coil slab for the purpose of locating the valve bulb.

Before placing the valve bulb into the well make sure that the well is free of moisture or water. This well should be filled with refrigeration oil, vaseline or glycerin to prevent ice forming over the feeler bulb, causing the valve to become partially paralyzed. Should the valve body remain exposed to room atmosphere where humidity exists it will soon build an ice bank over the power element and capillary tube of the valve causing erratic valve operation. The valve should be insulated within its compartment.

Control Settings

The freezer head in this multiple installation is the highest temperature evaporator, therefore both hardening and dispensing cabinet suction lines contain their respective check valves. The snap-valve on the dispenser is set to cut-out at nine inches vacuum. The cut-in should be five pounds pressure, using methyl chloride. This will maintain a cabinet temperature of approximately zero degrees. The Dual Pressure Control has the low side adjusted to cut-out 17 or 18 inches vacuum and cut-in at zero pounds. The high pressure switch of the control is set to open electrical circuit at 175 pounds head pressure.

Tubing Arrangement and Valve Location

Pay particular attention to the arrangement of the tubing below the freezer head. At the cross fitting located between the Detroit T.E.V. and the inlet of the freezer head you will notice one ¼ inch liquid line feeds to the T.E.V. of the hardening cabinet, another line is arranged to parallel a check valve with the freezer head T.E.V. The direction of flow through the check valve is from the freezer head back to the liquid line coming from the receiver. During normal operation the check valve remains closed and the pressure in the liquid line has a tendency to keep it closed, should it leak the result would cause long freezing time due to high back pressure. Its main purpose is to relieve the "above liquid line pressure" from the freezer head when the operator sterilizes the freezer head with 180° F. hot water. *Should this check valve be removed, severe damage to the freezer head can be the result.* The hot water used in sterilizing will cause the pressure of the refrigerant within the head to rise, and since the suction line valve is closed, the gas is compelled to flow backward through the tubing connected to the freezer barrel.

Should the freezer contain moisture laden refrigerant or moisture laden oil and at the same time the hardening cabinet T.E.V. is passing refrigerant there is a possibility that the moisture will lodge itself in the orifice of the cabinet valve. When such a condition occurs a dehydrator should be placed in this liquid line (between the cross and cabinet valve) to trap the moisture.

Expansion Valve Adjustment

With proper valve adjustment (all T.E.V. valves adjusted 10 degrees superheat) the hardening cabinet should maintain a temperature of —14° F. to —16° F. with the unit shutting off at 18 inches vacuum, assuming of course a normal distance between unit and load. A lower temperature is not necessary for hardening ice cream and will only increase cost of operation. With the settings as given above, should the machine continue to operate with an abnormal long running cycle, although the condensing unit tests efficient, the trouble may be located by feeling the cabinet panels for cold spots with the back of one's hand.

Part of the cabinet insulation may be damaged and/or water logged. In most cases where badly water logged insulation is found the unit will run continuously for 36 to 48 hours until the cabinet has reached an unusual low temperature. Once it shuts off it may remain on *off cycle* until the cabinet reaches a temperature sufficiently high to cause the ice cream to lose its consistency.

S S S

H. N. Stine
Berrysburg, Pa.

I can hardly get along without it, since I was getting it for almost one year I consider it one of the greatest necessities for my business as I have received some very valuable information from the REFRIGERATION SERVICE ENGINEER. It is the most interesting trade magazine I have ever read. I would not want to be without it.

Army Refrigeration Units Demonstrated at Food Service Conference

DEMONSTRATIONS showing how the Army Air Forces drops giant 3,000-pound refrigeration units to messing units in forward combat areas was a thrilling highlight of the first AAF food service conference which was held in San Antonio, Tex., January 24, 25, and 26.

Flying from nearby Bergstrom Field, an aerial convoy of ten C-47 cargo planes dropped men and supplies precisely on a 1,000 square yard parade ground at San Antonio Aviation Cadet Center while the audience heard through a public address system the crisp commands of a jumpmaster from 800 feet overhead. The supply bundles, popped out at a rate of 30 in six seconds by a newly developed conveyor belt mechanism, floated to earth on red, yellow and green parachutes.

As the battle-clad paratroops went into simulated combat maneuvers, cargo planes cut loose the nylon tow ropes to permit heavily laden gliders, piloted by combat veterans, to crunch smoothly to earth just in front of the reviewing stand. Mess personnel, who had parachuted to earth seconds earlier, dragged refrigeration and kitchen equipment from the gliders and within less than an hour after the first plane had appeared in the sky, a hot steaming meal was ready for serving to the paratroopers.

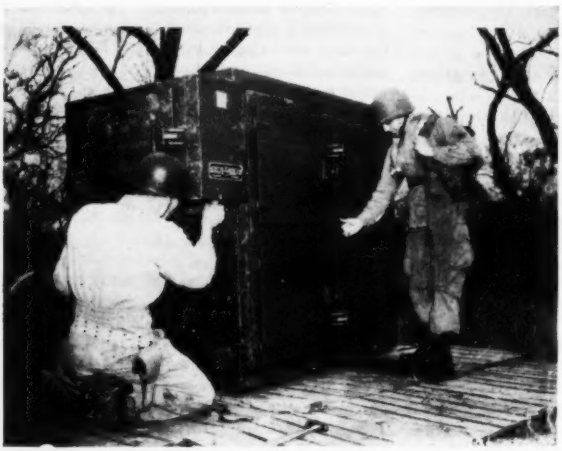
In the meantime, the 50-cubic-foot ton-and-a-half refrigeration units had been assembled and in a similar period of time had attained a temperature of 18 degrees below zero.

Gliders Carried Forward

Climaxing the demonstration was the return of the C-47's to snatch the reloaded gliders to carry them forward to a new location in emulation of actual battle practice.

Under the direction of Brig. Gen. W. R. McReynolds, air quartermaster, the First AAF Food Service conference assembled in San Antonio January 24 for the purpose of reviewing accomplishments in food service during three years of worldwide aerial warfare, to analyze the general problems of organization and to consider the possibilities for further improvement by a coordinated and integrated food service program. Representatives of the 15 AAF commands in the continental United States, leading AAF food authorities from Washington, including a score of general officers from various installations, and expert food consultants participated in the conference.

At San Antonio Aviation Cadet Center the conferees were welcomed by Lt. Gen. Barton K. Yount, commanding general of the AAF Training Command, and then plunged into a three-day program. Washington military representatives involved in the task of feeding Uncle Sam's fighting men pointed



Glider-borne field freezer ready to be put into operation.

"The Chart is a necessary part of my equipment"

so says this service man

• Now that the Calculator is being put to the test of practical use in the field, we have had a number of letters from service men testifying to its value. This one is typical.

Sometime ago I purchased a Head-Back Pressure Calculator from you, but misplaced it. The chart is a necessary part of my equipmemt, so please send me another.

J. V. Farmer

WRIGHT'S

H. B. P.

CALCULATOR

The purpose of the Head-Back Pressure Calculator is to quickly determine the proper head pressure, for the following refrigerants when the suction pressure, room temperature or mean water temperature is known.

Carrene — Methyl
Isobutane — Freon or F-12
Sulphur Dioxide — Ammonia
Carbon Dioxide

Actual Size 3½" x3½".

A Vestpocket Tool Every Service Man Should Carry

A number of troubles can be detected by comparison of the existing head pressure and what the head pressure should be, but in the past there has been no convenient method available to the service engineer to determine what the correct head pressure should be. Such variable conditions as the suction pressure, room temperature, water inlet and outlet temperature, kind of gas used, etc., all determine the proper head pressure. It is not practical to depend on one's memory of other similar conditions or to just use snap judgment when this handy calculator gives you the correct answer so easily. Send for it today! Sturdily constructed, with oil-proof finish, for on-the-job use.

POSTPAID $1.00

NICKERSON & COLLINS CO.

435 N. WALLER AVE., CHICAGO

out the angles peculiar to the AAF, such as "in-flight" feeding, use of non-gas-forming foods for high altitude bombing missions, and development of facilities for providing nutrition in the drastically different climatic conditions under which men fight and fly.

During night sessions conferees inspected foods, packing methods and container displays in the Gunter Hotel Rose Room. Food manufacturing, processing, packaging and distributing companies were represented and the subsistence research and development laboratories of the quartermaster corps displayed the various types of rations developed for use in combat operations.

Tour of Warehouses

Before dawn on the second day of the conference officers and civilians started a tour of warehouses and cold storage plants at Fort Sam Houston and to the Fort Sam Houston Bakers and Cooks Schools where they witnessed operations at the bakery which supplies four military installations in the San Antonio area and visited classes for mess personnel. At mid-morning the 60-jeep convoy was lined up by a San Antonio meat-packing establishment where the process of preparing quick-frozen boned beef for military shipment was demonstrated. After a tour of San Antonio Air Technical Service Command depots, the conferees had a typical GI lunch at a Kelly Field unit mess and began an afternoon of conferences on such subjects as elimination of food waste and planning of the war department master menu. Bakery training aids were demonstrated at the evening session.

Specialized Food Training

Opening with a 7 o'clock breakfast at the WAC mess at Randolph Field, the conferees spent the early morning portion of the final day on such subjects as central meat-cutting plants and fat conservation, garrison bakeries, central pastry shops, mess equipment and coffee brewing. Later special War Department consultants spoke on the use of civilian food authorities and information was developed regarding specialized food training for AAF personnel and on the subject of combat messes and training.

The final afternoon was devoted to a round-table discussion of AAF organization and food service programs in commands and special problems of the Army Air Forces. The concluding summary of the conference was delivered by Brig. Gen. McReynolds.

MILWAUKEE MAY LICENSE SERVICE MEN

A MOVEMENT is on foot in Milwaukee to license all refrigeration, electric appliance and radio service men, if a resolution prepared by assistant city attorney John J. Dolan is approved by the common council. Alderman Walter H. Maletzke, who is submitting the resolution to the council, had this to say on the subject of such licensing:

"Householders are entitled to protection against inexperienced repairmen. I have heard a number of complaints from people who said they were fleeced by self-styled experts."

As drawn up by the assistant city attorney, the resolution provides that licenses will only be issued to qualified electrical or mechanical engineers and to repairmen with at least three years of experience. It will also be possible for contractors to employ apprentices or helpers in the servicing line, but when such men are used on a job, under the supervision of a qualified expert, the contractor will be held responsible for the work done by the helpers or apprentices.

One contractor, discussing the proposed ordinance, said that it was a fact that some inexperienced repairmen had offered their services to housewives for the repair of refrigerators and appliances, but most householders were afraid to trust the work to itinerant workmen, preferring to call the service men of known contractors or service stations, as many have had sad experiences with men who offered their services but who later showed by their work that they knew little of the technicalities of repairing refrigerators or other appliances. In many instances the regular service station had to be called after an itinerant repairman had failed to make a good job of the repair work.

It is not claimed that contractors or regular service stations have sent inexperienced men to do the servicing, the resolution being aimed at fly-by-night repairmen.

AIR CONDITIONED SPIDERS ON WAR JOB

TO INSURE a better U. S. bombsight, refrigeration engineers of the York Corporation recently provided specially air conditioned living quarters for a race of pampered spiders in a Newark, N. J. war plant. Reason: Spiders' webs make the best cross hairs for bombsights, and to keep the insects spinning contentedly the year round, they must have controlled climate.

Normal or Abnormal Conditions

...Simply Select the Cartridge to Fit the Need!

Whatever your problem of moisture, sediment, sludge or acid—whatever its severity—DFN is the *only* System that gives you *flexible* protection against any combination.

The DFN System comprises an easily-replaceable cartridge and a permanent outer shell. Each interchangeable DFN Cartridge is a complete unit—dehydrated in controlled temperatures—hermetically sealed and ready for use when wanted. The DFN Shell itself stays on the job—is used over and over again. You merely change inexpensive cartridges as needed—multiplying your savings in time, labor and parts with each successive change.

Whether you need standard cartridges which *dry, filter and neutralize in one unit*—or special cartridges to meet temporarily aggravated conditions—the DFN System provides top performance at low cost. Ask your distributor or write us for Catalog R-7.

McINTIRE CONNECTOR CO., NEWARK 5, N. J.

Only the **DFN SYSTEM** DEHYDRATES FILTERS NEUTRALIZES

DEHYDRATORS • STRAINERS FILTERS • NEUTRALIZERS

WRECKED REFRIGERATOR REBUILT By G.I.s ON LEYTE

HOW an American soldier, formerly a refrigeration design engineer for the Southern California Gas Co. of Los Angeles, rebuilt a wrecked Electrolux refrigerator on Leyte Island during the early Philippine campaign, by using cocoanut husks for insulation, a GI belt for a wick and a mixture of diesel oil and 100 octane gasoline in place of kerosene, was told in a letter recently received by William S. Seidel, design engineer of the gas company, from Lieut. Col. A. G. Lindley, who formerly was employed in the same department of the gas company.

Col. Lindley prefaced his tale of jungle refrigerator servicing by remarking that, having come into possession of a case of beer (how the beer was obtained, the Colonel did not define), his company was anxious to devise a satisfactory means of cooling the beverage.

"We had just moved into (place name censored) and saw protruding from the wreckage of a house the old familiar handle of an Electrolux," Col. Lindley said in his letter.

"It was already known that at one time I had been associated with such luxuries as refrigerators, so I received an assignment peculiar to my present duties. The reputation of the home team was at stake, so I went to work."

The colonel explained the Electrolux was about a 1935 model equipped with a kerosene heating unit and had formerly belonged to an American resident of the locality whose whereabouts were unknown.

"I had four men remove the Electrolux from the wreckage and we started off down the trail and parked it beneath a spreading cocoanut tree. It had one hole in the side where a piece of shrapnel had gone through and rats had carried off most of the insulation, but, on the whole, the unit appeared to be in pretty fair shape."

"We stuffed cocoanut husks in for insulation. Did not have any kerosene but made a concoction of diesel oil and 100 octane gasoline. What wicked stuff!

"After cleaning out the heating unit I found that we were shy one wick. For some reason or another the Army does not stock Electrolux wicks. A GI belt is a poor substitute but was all that was available. We lit her up and ran her for about twelve hours, and the temperature on the inside went down to 85 degrees.

"I was getting worried. It couldn't be the thermostat because there is none on the unit, or, at least, I haven't found it yet. We poured in a little more gasoline, took out the metering valve and filed a bigger slot in it and lit her again.

"She took off like a steam boiler and in three hours we had ice. We cooled the beer and have since had ice cream, made of dehydrated milk and dehydrated eggs, four times.

"So far the electrolux has gone through three GI belts and the boys are saying that if we don't get rid of her soon we are going to lose our pants.

"I am not worried though because I expect her to blow up most any day. We had one other trouble with her; that white paint drew more bullets than honey does flies. She now has two more holes and a new camouflage job, which should entitle her to the Purple Heart."

S S S

HOME BUILT FARM REFRIGERATION

THE State College of Washington, Pullman, Wash., has recently issued a very complete bulletin No. 68 covering the building of refrigeration for farms.

This 34 page illustrated booklet discusses the type and size of walk-in cooler suitable for farms and includes plans and specifications for building coolers and zero temperature storage boxes for frozen foods. Several different designs are shown with full dimensioning of the drawings.

Other information such as: Location, size for farms, installation of machinery, compressor capacity, and a list of parts is included. Discussions and diagrams are presented on insulation, door building, electric wiring, installing vapor seal, and making the coils for the cold room and zero room.

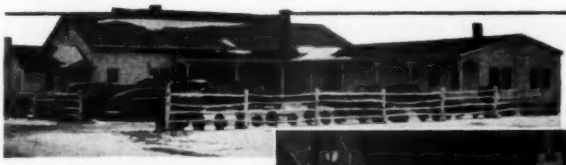
S S S

J.P. HOLDS OPA RULINGS INVALID

OFFICE of Price Administration rulings were declared invalid by John W. Ward, Justice of the Peace in Clayton Township, St. Louis, Mo., who refused to award triple damages asked for violation of OPA ceiling price on a used refrigerator. The Justice at the same time granted $100 damages to the man who had been sued for alleged ceiling price violation. He ruled that OPA regulations should not apply in "individual isolated cases" of sale of personal property.

"FREON" equipped locker plant

. . . a model of advanced design



Home of Country Life Frozen Foods, Inc., owned by Clinton G. Bush Co., N. Y.

• • •

G. Stuart Wishart, Mgr., demonstrates how patrons store food in lockers.

The attractive, rambling white farmhouse above is the home plant of Country Life Frozen Foods, Inc., at Westbury, Long Island, N. Y. It is considered one of the best equipped locker plants in the country.

Designed and built by the Bush Insulation Co. Inc., New York, the structure was opened in October, 1944. Plant facilities are of the latest design and provide a complete processing and locker service that won immediate acclaim. A growing waiting list of customers is evidence of its popularity, and the owners propose erection of a supplementary chain of branch locker depots.

"Freon" refrigerants are used exclusively because, states Clinton G. Bush, owner of the enterprise, "they are dependable, odorless and safe."

Chill, aging and locker rooms are held at temperatures ranging from zero to 32° F. Two 5 h.p. and two 2 h.p. Carrier Self-contained "Freon-12" Condensing Units serve these departments. Two additional 5 h.p. Carrier Units using "Freon-22" maintain a –30° F. temperature in the sharp freeze room. Zero temperature in a bulk storage department leased to a frozen foods distributor is controlled with a 2 h.p. Brunner and a similar Copeland unit. One Carrier Evaporative Condenser completes the compact installation. Duct work throughout eliminates sloppy defrosting.

When you have a locker plant job on hand . . . remember "Freon-22" is a "natural" for low-temperature refrigeration in quick or sharp freezing rooms. And for aging, curing and locker rooms, "Freon-12" provides dependable, trouble-free refrigeration you can recommend without hesitation. Write for complete information. Kinetic Chemicals, Inc., Tenth and Market Streets, Wilmington 98, Del.

• • •

"Freon" refrigerants are widely used in heavy duty air conditioning and refrigeration system.

KINETIC
FREON safe refrigerants
REG. U. S. PAT. OFF.

IN BUSINESS FOR YOURSELF

(Continued from page 32)

one from January 1 to June 31 and another from July 1 to December 31 with each broken down by months, that is, the budget should be by the month but for at least a six month period. The statement should be compiled every month and compared in detail each month with the budget for that month.

All of this sounds very complicated and your first impression is that you haven't time for all that sort of stuff. But, practically all the larger businesses operate on a budget basis. It is a necessary and integral part of their planning and of their analysis of all phases of their business. Most successful businesses that have operated on a budget system wouldn't think of trying to operate without one. You can worry along without keeping adequate accounts, and make a living, but to build up a business, proper accounting is essential.

S S S

NATIONAL MEETING OF FARM AND HOME FREEZERS ASSOCIATION

THE annual meeting of the Farm and Home Freezers Association was held in Chicago on February 27. New officers were elected to serve the Association during the present year and plans for industry activity were formulated. The officers are as follows:

President, F. J. Bommer, Sanitary Refrigerator Co., Fond du Lac, Wis.

Vice-president, J. K. Noel, Jr., Victor Products Corp., Hagerstown, Md.

Secretary, Stanley Bell, Quillen Brothers, Indianapolis, Ind.

Executive Secretary, E. G. Vail, Washington, D. C.

Treasurer, J. E. Wilson, Jr., Wilson Cabinet Corp., Smyrna, Del.

The present production pattern in the industry was discussed by various attendants. The manufacturers at present are generally engaged in production for war uses. Spot authorizations have been granted to manufacturers in various sections of the country but the material situation remains in such tight condition that production is very difficult.

The importance of good design and adequate construction of farm and home freezers was stressed in a discussion among the members of the group. They expressed a desire to have authoritative standards for rating and testing set up at the earliest possible moment for the protection of the public. This course was emphasized as especially important in a relatively new industry where the product has received such wide publicity in a time of extreme scarcity.

The members voiced appreciation of the fact that future progress of the industry depends a great deal upon having durable and well constructed equipment sold to the public when volume production is again permitted.

S S S

AIR CONDITIONING INCREASES PLANE PRODUCTION

AIR conditioning the fabrication room and dope shops has increased production of Navy training planes in the Philadelphia U. S. Naval Aircraft factory by 35 per cent. The equipment is designed to maintain an average of 80° and 62 per cent relative humidity to permit continuous production.

Stretching the fabric over the framework and applying the coating in the dope shop had to be suspended when the relative humidity exceeded 68 per cent or dropped below 58 per cent. The York Corp. in York, Pa. designed the equipment so that a constant relative humidity prevails in these important rooms. Any sudden change previously meant that the carefully stretched canvas like fabric would sag on the framework making it necessary to recover the entire plane.

Low relative humidity in the dope shop, according to Capt. A. E. Harrison, commanding officer of the factory, would produce thousands of tiny cracks in the coated surface. Recoating was not feasible because it reduced the air speed of the plane by 16 miles per hour. When cracking occurred, it was necessary to remove the whole covering to assure the best maximum performance.

The installation is connected into a steam plant which does the heating when required. Centrifugal compressors produce the equivalent of 275 tons of melting ice every 24 hours while the distribution system delivers 80,000 cubic feet of air per minute.

S S S

A REFRIGERATION and electrical supply service store, operating under the name of the Lafayette Refrigeration & Electrical Supply Co., has been opened at 3828 Farnsworth St., Indianapolis, Ind., by Earl K. Rudolph and Audrey S. Lay.

MORE GAUGE QUALITY —PLUS the "RECALIBRATOR"

Of course the first and foremost requirement of a pressure gauge is accuracy. But almost any gauge starts off accurate. The real measure of gauge quality is found in ability to stand up and *stay accurate.*

Marsh Gauges do. The Marsh reputation for making instruments of lasting accuracy is traditional. You would need no better reason for insisting on Marsh Gauges for every application. But you have still another reason—the Marsh "Recalibrator".

If some abnormal condition knocks a Marsh Gauge out of adjustment a twist of the "Recalibrator" screw will restore its accuracy at *all points* on the dial—a feat that cannot be accomplished with certainty by the conventional zero adjustment.

You get lasting accuracy when you select the Marsh Gauge . . . and on top of that the "Recalibrator".

JAS. P. MARSH CORP., 2059 Southport Avenue, Chicago 14, Illinois
Export Department: 155 East 44th St., New York 17, N. Y.

MARSH
Refrigeration Instruments

Service Managers Express Concern Over Shortage of Trained Personnel

CONCERN over the difficulty of keeping mechanical refrigerator repair shops in the field adequately staffed with trained personnel was expressed by manufacturers' service managers at the recent meetings of the Domestic Mechanical Refrigerator Industry Advisory Committee, the War Production Board reported February 23.

Trained field service men, who are being drafted for military service in increasing numbers, are extremely difficult to replace, committee members reported. They pointed out that replacement personnel, if obtained, cannot be given sufficient training before summer, when service demands are expected to reach an all-time peak because many refrigerators have passed their normal life expectancy but cannot be replaced and therefore must be kept in operation.

Though refrigerator repair and maintenance has been included in the list of "essential" activities compiled by the War Manpower Commission for the guidance of the Selective Service System, committee members said, no attempt has been made to establish "the relative essentiality of refrigerator repair and maintenance" as compared with other activities on the list. The committee urged that special recognition be given to the importance of keeping existing refrigerators in operation, to safeguard health and to maintain suitable refrigeration facilities for war workers.

Repair Parts Scarce

The scarcity of manpower affects also the production of refrigerator repair and replacement parts, though to a smaller degree, service managers said.

Demand for repair and replacement parts in 1945 is expected by committee members to average 35 per cent higher than in 1944, when demand was about 25 per cent higher than in 1943. WPB officials assured the committee that WPB would make every effort to provide sufficient materials to meet the increased demand.

Hermetically sealed units sent to factories for reprocessing usually cannot be returned to customers in less than 80 or 90 days, committee members said. About 75 per cent of the delay is caused by transportation difficulties, they explained. Time consumed in fitting the work into the factory schedule and in reoperating an individual unit varies from 48 hours to 15 days.

Reprocessing of open units frequently is delayed because such items as castings, valves and evaporators are difficult to obtain, the committee reported. Inventories of these and other parts are being depleted, because units are becoming more worn and more parts require replacement.

Service managers reported that the industry's voluntary program for the return of inoperative functional parts in exchange for new ones is being continued. Reconditioning by manufacturers of the parts turned in is an increasingly important factor in meeting service requirements.

Production of alternating current fractional horsepower motors, stepped up progressively during 1944, averaged more than 450,000 units per month in the fourth quarter as compared with average monthly production of 250,000 units in 1943, WPB officials said. They added that production is expected to be maintained at about the fourth-quarter level during 1945. They pointed out, however, that increased military requirements for motors for heavy artillery, rockets and planes necessitate frequent diversion of facilities in motor plants, with the result that production of motors for refrigerators may fluctuate for several months, until the military demands have been met.

Continuing tightness of the supply of sheet and stainless steel; aluminum sheets, extrusions, rods and bars; copper and zinc, principally as the result of increased military requirements and the shortage of manpower for increasing production, was reported by WPB officials. Production of Freon has been increased, and the supply is expected by WPB to be sufficient to meet the most essential needs. Military demands for valves, electric controls and bellows have been stepped up, and the supply is critical. WPB officials advised industry members to schedule production and place orders for materials as far in advance as possible.

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New Deferment Method for Refrigeration Repairmen — Quick Action Essential

MANY pleas for assistance in retaining experienced men on their regular refrigeration machinery repair work were received by the National Refrigeration Service Council in recent weeks. These requests came from all sections of the country as a result of manpower drives by Selective Service. It was reported that the few men under 30 who remain in repair work are rapidly being withdrawn along with many older men. A large number of draft boards without sufficient knowledge of the necessary work performed by the industry are also ordering men to switch to war plant jobs, or be drafted.

In an attempt to improve this situation arrangements were made for representatives of the council to meet with the Manpower Commission which recommends the classifications to selective service. In advance of this hearing on February 13, a committee of the council met in Chicago and drafted a brief of the present critical situation in refrigeration machinery repair activities for submission to the War Manpower Commission Committee.

Essential Nature of Industry

This brief called attention to the fact that selective service boards are not aware of the essential nature of the industry. It stressed the fact that men in the industry are called upon to repair a large number of additional refrigerating systems in war plants, war supporting operations, food processing, hospitals, and in food preservation and distribution. Reports quoted from the field also showed that manpower is so short that present workers are not able to keep up with the job during the winter months, although it is bound to increase as warm weather approaches.

Special attention was called to the fact that experienced men are absolutely necessary, not only to handle the diversified equipment, but also to direct the further training of new men brought into the industry as helpers. Schools established under council procedure have provided the training course for approximately 10,000 men of which 85 per cent are available as helpers in the industry. On the other hand, these trainees require proper supervision and guidance in order to carry on their work. This is another reason why it is so necessary to retain experienced men in the industry.

The brief was sent to the Committee of W.M.C. and on February 19 the council representatives met with them. Formal request was made to have refrigeration machinery repair included in the list of critical occupations. Supporting information submitted from refrigeration councils throughout the country was presented to the committee.

At the conclusion of the presentation, the Council representatives were informed that the methods of setting up occupational deferment in Selective Service Boards were undergoing revision at that time and announcement of the changes to relegate the critical list to a minor role would be made in a few days.

New Deferment Method

The new rules as they apply to refrigeration repairmen are based on certification by a designated war agency that a particular man involved in the application is indispensable and not replaceable. Only a relatively few men under the age of 30 can be certified for occupational deferment. The employing company, or the individual if he is self-employed, must make up requests for deferment on Form 42A Special and have them certified by War Production Board. It is evident that only those applications so certified will be considered by Selective Service Boards. A bulletin from W. R. Kromer, chairman of the National Refrigeration Service Council on February 27 gave exact directions on the course to be followed in keeping experienced refrigeration repairmen on the job.

What to Do

The War Production Board has been designated as the "certifying agency" for refrigeration machinery repair operations in connection with Selective Service. Each contractor or company should list all men under 30 at once with the local WPB office. This list, in triplicate, should name all employees

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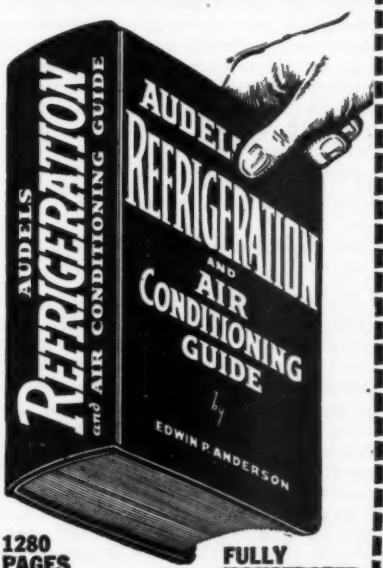

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under 30 who are now or were, on January 1, 1945, classified as 2A or 2B, excluding those known to be classified as 2a (F), 2b (F) or 2b (L). The men are listed in order of importance to the plant or establishment, the most essential, irreplaceable men coming first on the list.

The name and address of the establishment heads the list along with the War Production Board as the certifying agency and a statement of the total number employed. Then the men are listed under the following headings: name of registrant, age, occupation, selective service order number, local board, present selective service classification. The following certification must be placed on the list and signed by a company official, "We certify that all men listed above are now in our employ, are now or were classified 2A or 2B on January 1, 1945 and are in the age group 18 through 29, that such list has been submitted to no other certifying agency."

Two sets of Form 42A Special are submitted with the list to WPB for each man for whom the employer feels he must obtain deferment.

The War Manpower Commission has notified all field offices that the critical activities indicated in previous instructions have no significance in the administration of employment stabilization, ceilings and priority. This should reduce the tendency to favor so-called war jobs at the expense of refrigeration machinery repair.

All cases involving experienced repairmen or key organization men over 30 should be appealed to the local board, to the state director if the local board is unfavorable, and finally to the National Council Selective Service representative, Jack Bartlett of the Electric Institute of Washington. He should be called upon only after all other appeals have been made and rejected and then all information regarding age, order number, draft board, experience, employment, and action on appeals should be given. Mr. Bartlett agreed to help out and maintain contacts in Washington, but his assistance should not be requested except as a last resort, and then full information must be furnished to him.

Mr. Kromer further suggests immediate contact with the nearest Office of Civilian Requirements representative or War Manpower Commission, regional or state director, for assistance in returning experienced men from other industries to refrigeration repair work to help maintain equipment this summer.

Immediate Action Important

Only a small proportion of the total men under 30 will be deferred under the new Selective Service rulings. An allotment of 15 per cent is given to each establishment as a maximum and the certifying agency also has a further 15 per cent leeway to cover inequalities and special hardship. These are maximum figures and an attempt is being made to keep the total certified for deferment at less than an aggregate of 30 per cent. For this reason only those companies and individuals who act quickly will have any real opportunity to secure further deferment for their key personnel.

Kromer Chairman of Council

In the business session of the Service Council, W. Ray Kromer of Cleveland was elected National Chairman. Mr. Kromer, whose resignation as National Director was accepted at the same time, has been the key figure in the work of the Council which resulted in the establishment of schools throughout the country and the training of 10,000 men in refrigeration machinery repair during the past two years. The local councils established to operate the training program have also coordinated various factors in the industry for effective work on selective service and other problems of the group.

S S S

GOVERNMENT BUREAUS

(Continued from page 20)

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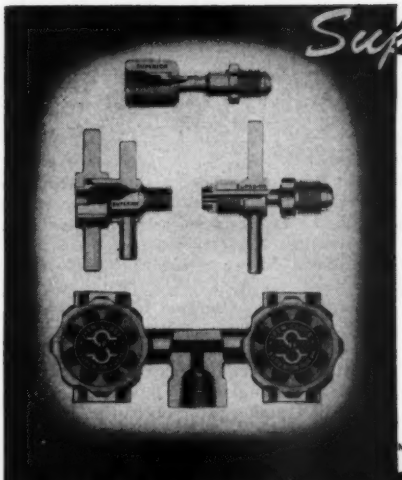
Furthermore, it was said, imports of fluorspar from foreign countries, chiefly Mexico and Newfoundland, are made possible only by the use of substantial subsidies, and supplies are available solely for essential war uses. While most imports are of metallurgical fluorspar, this type is being converted to the acid grade.



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Service Council Presents Testimonial to Paul McNutt of WMC

REPRESENTATIVES of the National Refrigeration Service Council who attended the recent Washington meeting presented a plaque to Chairman Paul McNutt of the War Manpower Commission as an acknowledgement of the assistance given the refrigeration repair industry through the Bureau of Training and affiliated agencies of WMC. This assistance had made possible the setting up of schools by local councils in all parts of the country and recruiting of trainees to take the courses.

A total of 10,000 trainees took these courses and estimates based on the reports from the various schools indicate that 8,500 apprentices were trained for service in the industry. In presenting the plaque to Mr. McNutt, W. R. Kromer, chairman of the Council, called attention to the fact that a critical situation existed in the industry and that continued operation of essential refrigerating machinery was threatened because of the lack of manpower to repair and maintain it. The training program had an important part in carrying the industry through this critical period, and he acknowledged the valuable cooperation of the War Manpower Commission in making the training program possible.

In expressing sincere appreciation for the commission Mr. McNutt paid tribute to the cooperation and initiative of the Council in the joint effort.

Above: Paul V. McNutt, War Manpower Commissioner, receives testimonial from Ray Kromer as Harry Alter and John Tessari look on.

Right: Service Council delegation looks happy for photographer but not about manpower situation. Seated: Charles Harris, Harry Alter, Ray Kromer, John Tessari, W.M.C. Standing: Warren Farr, George Roche, Emerson Brandt, P. S. Van Wyck, W.M.C., Nathan Edelstein, R. S. Ward, W.M.C., Theodore Reina.

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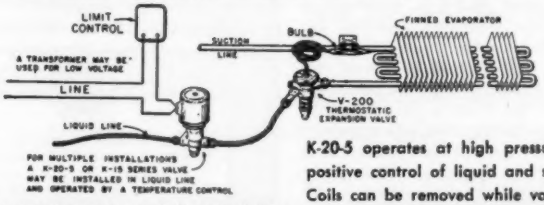
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Refrigeration Service Engineers Society

Official Announcements of the activities of the International Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

INTERNATIONAL HEADQUARTERS: 433-435 North Waller Ave., CHICAGO 44, ILL.

WATERBURY AREA PETITIONS FOR CHARTER

AT A recent meeting of refrigeration men in the Waterbury, Conn. area a petition for charter to become affiliated with the International R.S.E.S. was signed by fourteen new men and six present members of the society. Those signing the petition were: Seamen Decker, Michael Zello, Joseph Elmskas, Edgar Hughs, Melvin Terrill, Glenn Bunker, Patsy Ducillo, Felix Guarini, John Hyland, Raymond Peffers, Arthur Baril, Leo Roy, O. J. Campeau, and Augustine Barbiero.

PUBLIC SERVICE AND EDUCATION PART OF YOUNGSTOWN CHAPTER ACTIVITIES

SHOWING what can be accomplished in public service and education, the Youngstown Chapter R.S.E.S. arranged a program for their February meeting on Frozen Foods. Wayne Carver, authority on the development, growth and future of one of the world's greatest industries, talked on Frozen Foods of the Future to a capacity audience of some 1200 guests and members of the Chapter in the V.F.W. Auditorium, 225 W. Boardman, Youngstown, Ohio.

The program was presented by the Youngstown Chapter of the Refrigeration Service Engineers Society as part of their program of public service and education. A very effective circular announcing the program was distributed to the public inviting them to attend this enlightening talk.

Eldon S. Wright, President in cooperation with the members did a splendid job of publicizing the meeting. Mr. Wright states that this is the kind of promotion that does R.S.E.S. good in the community in which the members serve. Among those invited were the members of the Retail Grocers Association and individual customers of service companies. No admission was charged but each guest was required to present a ticket secured from one of several companies or food distributors listed on the back of the circular.

COOPERATIVE ADVERTISING STARTED BY SAN DIEGO CHAPTER

REALIZING the benefits of advertising to each individual member, San Diego Chapter R.S.E.S. has inserted a maximum size ad (one-half page) in the local telephone directory. The large display ad reproduced here calls to the attention of refrigeration users the kind and type of service rendered by members of the R.S.E.S.

REFRIGERATION SERVICE ENGINEERS SOCIETY
THE ONLY INTERNATIONAL ORGANIZATION REPRESENTING THE REFRIGERATION SERVICE FIELD
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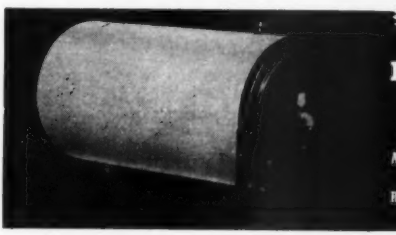

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Following the display is a listing under Refrigeration Service Engineers Society with the emblem of the society again appearing. The following statement is made under this listing: "Only international organization representing the Refrigeration Service Field. Trained and experienced engineers who subscribe to the ethical standards of Business Practice." Under this heading appears the names of firms whose owners and employees are members of the Society.

The same emblem appears throughout the classified section of the telephone directory for each individual company advertisement. Mr. M. R. Hanks, originator of the idea and its execution states that it is the first time to his knowledge that a Chapter has attempted this form of complete classified directory publicity for its members. San Diego Chapter is a live working organization thinking in terms of benefits for its members both for the present and future.

WISCONSIN STATE ASSOCIATION ORGANIZED

FOLLOWING through from the preliminary meetings of R.S.E.S. state members, the Wisconsin State Association was formed at a meeting held at the Capitol Hotel, Madison, Wis., February 17 and 18.

The opening meeting was devoted to a banquet attended by sixty members and others interested in R.S.E.S. affiliation. After dinner, Herman Goldberg as master of ceremonies introduced several after dinner speakers. Short talks on R.S.E.S. and State Association activities were made by Paul Reed, Archie Fait, Illinois State Association President, and Clarence Buschkopf, acting president of the International Society.

Representing International Secretary, H. T. McDermott, R. L. Hendrickson discussed the advantages of membership in the Society and the added value of State Associations. Mr. Hendrickson also read a letter from the Chicago Chapter expressing their best wishes to the success of the Association.

The preliminary work having been so carefully planned and prepared, made the business session on the following day a successful meeting. The meeting was called to order by James A. Hughes of Madison, who nominated Lee Miles as temporary chairman. Mr. Miles took the chair and called for an election of a temporary secretary. A. L. Robinson was elected.

Only minor changes were suggested for the Constitution and By-Laws as prepared and submitted by the committee. Several in attendance who were not members then joined the R.S.E.S. as members-at-large or Chapter members so they could participate in the State Association activities.

The By-Laws were so written that fair and equitable representation was given to each of the 14 districts of the State. It was decided to hold the first annual meeting of the Wisconsin State Association at Madison inasmuch as the members of Madison Chapter was largely responsible for the preliminary formation work.

At the close of the regular business, Mr. Waterman of the Wisconsin Industrial Commission and Mr. Pearson of the U. S. Employment Service outlined the activities of their respective offices in placing men in the various trades.

R.S.E.S. Chapter Notes

TRENTON CHAPTER

Trenton, N. J., Feb. 21—At this meeting, the following men were elected as officers for the coming year: *President,* Sam Cohen; *Vice-President,* John Del Vecchio, *Second Vice-President,* Joseph E. Lane; *Secretary-Treasurer,* Marcel Liberty; *Sergeant-at-Arms,* Albert A. Koller. After the election, it was decided to have the annual dinner at the Club Condado on March 27 and to install the officers then. This dinner was to take the place of the regular March meeting.

The meeting was then turned over to George Frie who read a paper on "Complete Automatic Defrost for temperatures below freezing without the use of electric heat, water or any outside agency of heat." The points were illustrated by steropticon slides; then there was an actual demonstration of this defrosting by a working model of the Kramer Thermo Bank.

TRI-COUNTY CHAPTER

Aurora, Ill., Feb. 17—The entire meeting was devoted to the initiation of new members. No business session was held except to fix the place and date of the March 17th meeting to be held at the home of Frank Kennelly, 220 Henderson Ave., Joliet, Ill. J. B. McGuan acted as judge and master of ceremonies. He was ably assisted by several charter members serving on the committee. Their efforts were very much appreciated.

The following members were initiated: Harold Ellis, Fred Johansen and Frank Kennelly from Joliet; Foster M. Ford, Morris; Ralph, May and Steve Vargo, Aurora and Harry I. Spring and Oscar Starin from Elgin. Refreshments were served during and after the initiation ceremony.

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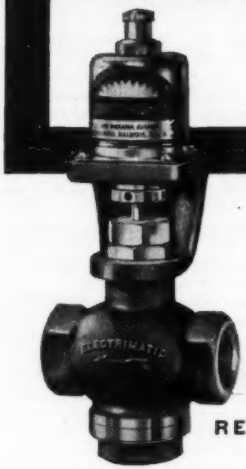

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WP regulating valves are available in ⅜", ½" and ¾" FPT sizes and other valves of other types are available in sizes ranging from ¾" to 2" FPT.

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HOME FREEZERS promise a future market of 500,000 units a year! The new BEN-HUR Farm and Home Freezer will be ready to open this profit opportunity to YOU.

ALREADY laboratory tested—proved under all operating conditions — designed by experienced engineers and famous industrial artists, BEN-HUR Farm-Home Freezers will offer a complete line to suit all home needs.

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MILE HIGH CHAPTER

Denver, Colorado, Feb. 17—A record attendance of 100 members and their wives and guests were present for the annual dinner party held at the Albany Hotel. After formally greeting all present, Mr. Barley had the secretary refer to his records for the last dinner party held in 1942 when the attendance was 86. Further search revealed a membership of 23 at that time as compared to 87 now. The membership is comprised of 44 from Denver; 32 from Pueblo; 6 from Colorado Springs; 14 from other near towns.

Out-of-town guests for the evening were: C. R. Black, Kansas City; Mueller Brass Co.; G. M. Kingsland, Minneapolis, Minneapolis-Honeywell Regulator Co. Mr. McCombs, Chairman of the Entertainment Committee, introduced Ted Foulk of the Public Service Co. of Colo., who is local coordinator of the National Refrigeration Service Council. Mr. Foulk discussed the importance of refrigeration service and outlined the procedure to follow in requesting draft deferments for essential servicemen.

The entertainment feature of the evening was presented by a magician and three beautiful girls who performed their tricks and entertained with jokes for a half hour.

The concluding and educational program was under the direction of Mr. Kingsland who showed two films of a Walt Disney training film made for the armed forces.

CENTRAL CONNECTICUT CHAPTER

Hartford, Conn., Jan. 29—The meeting was called to order by President Andreen. Minutes of the November meeting were read and accepted. Two members were asked by the President to serve on a Manufacturer's Committee and act on problems that might arise. John Paul and James Felix volunteered to do this. President Andreen gave a report on the Massachusetts State Convention. He announced that the Massachusetts State Chapter has disbanded in favor of a New England State Association.

A report from the State License Committee was given. The proposed contractors license bill has been drawn up and has been approved by the New Haven Chapter which has promised financial support. Upon motion the bill was accepted.

Nelson Port of the Ansul Co., presented motion pictures and lectured on the reaction of aluminum and methyl chloride when used together in a refrigeration system.

The following officers were chosen for 1945-1946: *President,* John Barrett; *Vice-President,* Edmund Logan; *Second Vice-President,* Clarence Riedle; *Third Vice-President,* Charles Bidwell; *Secretary,* Frank Tarala; *Treasurer,* John Paar; *Sergeant-at-Arms,* Louis Strauch; *Educational Committee,* Joseph Simons; *Board of Directors,* Arthur Andreen, James Felix and Douglas Hickox.

Snapshots at Annual Dinner Meeting Mile High Chapter. Above: Two views of speakers table. Below: Two general views showing some of the large crowd.

REFRIGERATION SERVICEMEN

Your customers who own Meter-Misers depend on you to keep them in operation.

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Customers and service men alike are finding this gas measure up to their standards of performance in Meter-Misers. Servicemen experience no difficulty in making this replacement to the complete satisfaction of their customers. Meter-Miser service becomes a routine call to the shop that carries a supply of HERVEEN.

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(home-study instruction *balanced* with actual shop practice) is designed to help a man *make headway*, no matter how old or young he is in the business. It is the refrigeration and air conditioning training that has been proving its value for the past 17 years.

See the coupon below? Plenty of men—men in practically every branch of refrigeration work—have used a similar coupon to find out how to start getting SOMEWHERE instead of nowhere, by means of interesting spare-time training. Do you think *you* should send it in?

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PHILADELPHIA CHAPTER

Philadelphia, Pa., Feb. 22—The meeting was called to order by James J. Keers and the following officers were elected: *President,* Harry Zimmerman; *Vice-President,* Boyd Bush; *Secretary-Treasurer,* James J. Keers.

After being inaugurated, Mr. Zimmerman gave a splendid address and outlined a progressive program for the balance of the year, emphasizing the fact that all members must aid in the work by their presence at the meetings. He also questioned all members present on their particular work in the refrigeration field to ascertain on what branch of refrigeration the lectures and demonstrations are concentrated and offered the facilities of his shop to any members wishing to learn the construction of any of the well known refrigerators. The members were also urged to bring refrigeration problems in at the next meeting for discussion.

TWIN CITIES CHAPTER

Saint Paul, Minn., Feb. 6—President Frank called the meeting to order. This was an open dinner meeting with approximately 100 members and guests attending.

Following the dinner, a very interesting lecture and motion picture on Electronics and the C1 Auto-Pilot was given by G. M. Kingsland representing Minneapolis Honeywell Regulator Co.

MONUMENTAL CHAPTER

Baltimore, Md., Jan. 10—The meeting was called to order by President Jack Ottenheimer. A motion was made to adopt a card system instead of the roll call to get a better attendance at the meetings.

Mr. Roche then introduced Cecil Boling who gave a very interesting talk on low side coils and correct sizes of liquid and suction lines.

KANSAS CITY CHAPTER

Kansas City, Mo., Feb. 7—The meeting was called to order by President M. L. Ferguson at the Hotel Bellerive, 214 E. Armour Blvd. A good attendance was present.

The following applications for membership were read: John T. Griffits, Harrel N. Kilgore, Lloyd E. Kahle, Russell W. Moore, Rodney C. Tarter, Walter E. Mitchell, Frank G. Thornton, Ray F. Culver.

Mr. Rostock, Chairman of Entertainment Committee, reported on the developments for the Annual Dinner-Dance.

Cecil R. Visger announced he had been invited to serve on the Service Improvements Advisory Committee.

The meeting was turned over to "Bill" Schreiber, Chairman of Educational Committee, who did a good job of explaining and giving the equation for figuring motor horse power for a given compressor.

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RED SPOT FURNISHES CLUE TO REFRIGERANT LEAK DETECTION
VISOLEAK is a finely-treated colored refrigerant oil which penetrates every nook and cranny of the system. The leak is indicated by a red stain – similar to the discoloration on a carburetor in which ethyl gasoline has been used. Can be used safely and effectively with any type of refrigerant. See your jobber today. If he has not stocked Visoleak write for complete information.
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4 ounce bottle $ 1.00 48 bottles
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SAVE 10% ON CASE LOTS
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MOUNT ROYAL CHAPTER

Montreal, Canada, Feb. 5—This was the first meeting under the new executive. Despite the cold weather there was a large attendance. The newly elected president, Ovila Fabien, presided.

First on the agenda was the regular chapter business after which educational movies were shown by a genial educational chairman, Guy Forget. Mr. Gendron of the entertainment committee discussed the progress he had made with regard to the annual supper dance to be held at the close of the Interprovincial convention.

BOSTON CHAPTER

Boston, Mass., Feb. 13—The meeting was held at the Hotel Manger with President L. W. Pierce, presiding. Prior to the regular business meeting, Mr. Snyder of the General Electric Co., talked on the application and usefulness of ultra violet ray lamps in walk-in coolers, rooms, and air ducts.

During the business meeting, the membership committee reported favorably on Albert Rosato, Alfred Wright, Philip Whittemore, Frank Vieira, Chester Flint, and Henry Riley. Two new applications were referred to the committee.

In cooperation with the war effort, the chapter decided to have no annual spring party as had been the custom in the past.

CLEVELAND CHAPTER

Cleveland, Ohio, Feb. 8—The meeting was opened by the retiring president, Warren Farr. After a favorable report by the auditing committee, the treasurer's report was accepted. Mr. Farr then turned the meeting over to the president elect, Paul Spring.

Mr. Spring outlined the activities for the coming year covering points submitted for programs of interest to the members. A. M. Fenwick was appointed to serve on a code committee to assist in compiling a code at the request of the Cleveland Section of A.S.R.E.

Feb. 22—C. P. Eich of Nash-Kelvinator Corp., who presented a talk covering the servicing of Kelvinator units from the early to late models. Charts accompanying his talk materially assisted in presenting this interesting topic.

MAGNOLIA CHAPTER

Jackson, Miss., Feb. 14—This regular meeting was held at the Odom Refrigeration Supply Co., 401 Broad St. Mr. Shafer presented the retiring president, L. H. Williford, Jr. with a certificate from the chapter.

Action was taken on a change in the chapter By-Laws to define a quorum for any business meeting. Members missing four successive meetings are to be held in temporary suspension.

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SOUTH OHIO CHAPTER

Portsmouth, Ohio, Jan. 10—Business of the meeting was the election of officers. Successful candidates were as follows: *President,* Forrest Poole; *Vice-President,* C. Bussell; *Secretary-Treasurer,* G. P. Kant. H. E. Journey, brother of member J. W. Journey, was accepted to membership.

It was decided to make the next meeting a combined steak dinner and educational meeting to start the new year's activities.

Feb. 14—The opening part of the meeting was held at Cameo Restaurant with Mr. Stewart of Nash-Kelvinator Corp. and C. C. Ahlgrim of Redisco as guests.

The meeting then convened at the shop of C. Bussell where Mr. Stewart led the discussion and very ably answered all questions asked by those in attendance. Mr. Ahlgrim then outlined a finance plan for servicemen that offered possibilities to permit anticipation of their needs.

READING CHAPTER

Reading, Pa., Feb. 6—The meeting was opened by President Stanley Mathias who received reports from Mr. Larson on the educational programs and Mr. Heltzinger on refreshments for meetings. Two applications for membership were read and referred to the membership committee.

The evening's educational program was conducted by Albert Dill of the Ansul Chemical Company. Mr. Dill showed pictures of the reaction of methyl chloride on aluminum and concluded the evening by familiarizing those present with the duGas fire fighting equipment also manufactured by Ansul Chemical Co.

Feb. 20—President Mathias called for a vote on the applications of Carl Haueisen and Leonard Scheffey. Members present voted to accept these two new members.

The meeting was then turned over to the educational committee. The Chairman, Mr. Larson, called on Charles Logan of the Superior Valve & Fittings Co.

LOS ANGELES CHAPTER

Los Angeles, Calif., Jan. 31—Installation of officers was arranged as a full evening of entertainment at the Cabrillo Hotel. The newly elected officers are: *President,* V. F. Denny; *First Vice-President,* F. C. Kirkham; *Second Vice-President,* A. O. Ludtke; *Secretary,* J. C. Rodgers; *Assistant Secretary,* J. R. Hill; *Treasurer,* G. R. McLay; *Sergeant-at-Arms,* G. Kelly; *Educational Chairman,* Merle Stutzman.

Promotional mailing was used to tell the members of the meeting. The feature entertainer was Mr. Deley, past President of the Magician's Guild in Pasadena who "pulled rabbits from hats" and performed many other "hand is quicker than the eye" stunts to the amazement of all.

INTERPROVINCIAL ASSOCIATION

Leaside, Ontario, Jan. 25—An executive meeting was held at the Wagner Electric Co. office to conduct the regular monthly business. Two new applications were received.

The gas and tire committee reported that very little aid could be expected for any civilian activity and the postponement of the original aid set up for service men in essential work. Action was taken to survey the needs of refrigeration service men to forward to the office of the Rubber Controller.

Boundary lines for Ottawa and New Brunswick Chapter were approved. Nova Scotia and New Brunswick Chapters reported having had very fine meetings.

Satisfactory progress was reported on the convention plans for March 18 and 19. All speakers had been obtained and the details were nearing completion.

NIAGARA FRONTIER CHAPTER

Buffalo, N. Y., Jan. 26—After the regular business had been handled, the meeting was turned over to J. W. Stevens of Syracuse, representative of Minneapolis-Honeywell Co., who discussed types and kinds of controls suitable for refrigeration applications.

TRI-STATE CHAPTER

Huntington, Va., Feb. 13—Meeting was called to order by President Albertsen at the home of C. A. Brunton. A report of the nominating committee was made for the selection of officers. Officers for the year were elected as follows: *President,* A. W. Gruber; *First Vice-President,* Joe H. Campbell; *Second Vice-President,* M. A. Nuzom; *Sergeant-at-Arms,* Geo. Newton; *Secretary,* Geo. W. Donthat; *Treasurer,* C. A. Brunton.

Installation of officers was arranged for the next regular meeting, to be planned at the annual dinner meeting. Mr. Brunton then gave a brief talk on the Early History of Mechanical Refrigeration.

Ladies Auxiliary

MOTOR CITY AUXILIARY

Flint, Mich., March 1—This year's first regular meeting was held at the home of Mrs. David Fortune. After covering regular business affairs the annual election of officers was held. New officers are: *President,* Mrs. Clare Babcock; *Vice-President,* Mrs. Lester Gettler; *Secretary,* Mrs. Chester Morgan; *Treasurer,* Mrs. Norris Gunnell.

NIAGARA FRONTIER AUXILIARY

Buffalo, N. Y., Feb. 9—Mrs. Muller opened the meeting at the home of Mrs. Wm. Goeckel, then turned it over to the new President, Mrs. E. Orsolitz. Two new members, Mrs. T. Jordon and Mrs. S. Szyszkowski, were accepted to membership.

WRITE FOR CATALOG

Due to the paper shortage we will not issue a catalog in 1945.

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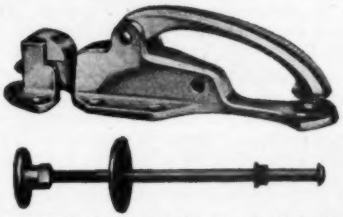

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Domestic Controls reconditioned equal to new at a small cost. All work guaranteed for one year. Prices upon request.

United Speedometer Repair Co.
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TWIN CITIES AUXILIARY

Minneapolis, Minn.—Eleven ladies of the chapter and one guest gathered at the Red Feather for a delicious dinner. After dinner all attended the Lyric Theatre and later joined their husbands at the close of the Twin Cities Chapter meeting.

KANSAS CITY AUXILIARY

Kansas City, Mo., Feb. 7—Mrs. L. A. Mendenhall called the meeting to order at the Hotel Bellerive. Those present acted on the preparation of a Constitution by appointing Mesdames Hoover, Wilde, Haller, Ferguson, and Visger to draft the constitution.

Other activities for the evening were the selling of chances on towels made by Mrs. Taylor and a Travel Fun Quiz. At the conclusion of the evening, ice cream was served.

GUN TURRETS TESTED IN STRATOSPHERE CHAMBER

POWER-OPERATED gun turrets receive functional tests at 60° below zero in the "stratosphere chambers" of The Emerson Electric Mfg. Co., St. Louis, Mo. Not being content to test performance of sub-assemblies under stratosphere conditions, the Engineering Department conducts functional firing tests of complete airplane gun turrets in severe arctic temperatures.

Emerson's cold room, which is roughly 18 x 18 x 26 ft. high, will accommodate two turrets. Target apertures are two small doors four by four feet which open onto the firing range. This chamber is designed to simulate extreme temperatures from minus 60 to plus 120° F.

The modern bomber represents hundreds of thousands of dollars in equipment alone. Manpower is even more precious. By testing accurately these defensive units in simulated atmosphere conditions, before they are used in actual combat, vast fortunes in men and material may be saved.

Component assemblies in the past have been tested in small chambers wherein temperature, density and humidity are controlled. But the Emerson cold room, equipped with refrigeration and air conditioning by Carrier Corporation, using Alco valves, and installed by the Austin Co., tells the final story.

Regular winter flying suits are worn by Engineers during tests. No discomfort is felt for a short period. But after a half-hour's work under sixty below conditions, moisture from breathing frosts the eyebrows and eyelashes. Special helmets are necessary for these longer sessions.

CONSIDER ICE CREAM CABINET STANDARDIZATION

THE Simplified Practice Committee, International Association of Ice Cream Manufacturers, met at New York recently to discuss standardization of ice cream cabinets and cans with representatives of cabinet and can manufacturers.

It was suggested that greater utilization of cabinet space might be achieved by using different size and shape of cans and/or by making changes in the cabinets. Standardization of lids and openings of cabinets, it was brought out, is an important part of such a program. Limitations imposed by soda fountains, it was stated, are extremely important in any consideration of cans and cabinets.

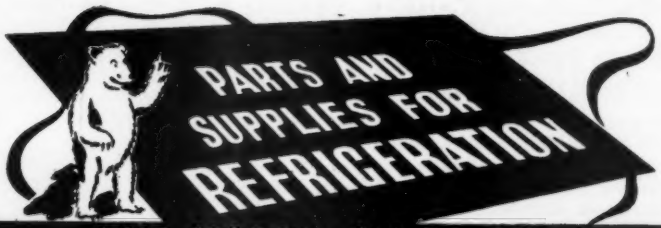
The meeting on March 1 followed a combined meeting of the Committee with representatives of cabinet and paper container manufacturers on February 15. No definite recommendations were made as a result of the meeting on March 1, but it was unanimously agreed that changes could be made which should ultimately work to benefit the ice cream industry, the cabinet and fountain manufacturer, and the container manufacturers.

CENTRAL STATES REFRIGERATION SUPPLY JOBBERS MEET

THE first meeting of the Central States Refrigeration Supply Jobbers was held Friday, February 23, 1945 at the Stevens Hotel in Chicago. Many mutual regional problems were discussed. It was decided that as a group many local problems can be worked out to the satisfaction of its members, partly due to their operations in competitive areas.

Among those present were H. S. McCloud, executive secretary of the N.R.S.J.A.; Irving Alter, Harry Alter Company, Chicago; H. W. Blythe, H. W. Blythe Company, Chicago; Jack Glass, Chase Refrigeration Supply Company, Chicago; L. C. Keely, Airo Supply Company, Chicago; J. B. McGuan, Automatic Heating & Cooling Company, Chicago; Gustave A. Larson, Gustave A. Larson Company, Milwaukee; P. Ravanesi, Service Parts Company, Melrose Park, Illinois; Dick Potter, U. S. Electric Company, Springfield.

Jack Glass of the Chase Refrigeration Supply Co. was elected Chairman of this group. The next meeting will be held March 30, 1945 at the Stevens Hotel in Chicago.



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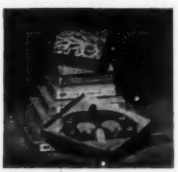

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In the interest of conservation, see that Victory Vital V-Belts are properly installed with rust-free pulleys in correct alignment and with proper tension.

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Brush or spray Nobs Glazecoat directly on rust. Rust aids in forming a permanent thermo-plastic coating that is not affected by water, alcohols, dilute acids, or alkalies. Prevents further rusting. Stands heat to 400° F. Covers about 300 sq. feet per gallon.

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MOFFATTS, LIMITED, CANADA TO BUILD CROSLEYS

CANADIAN-BUILT Crosley Corporation-designed radios, home freezers, and Shelvador refrigerators will be made by Moffatts, Limited, of Weston, Ont., when the European phase of the war is concluded according to a new agreement reached by the two companies.

Crosley in the United States, like Moffatts in Canada, is now engaged in 100 per cent war work, it was pointed out. Necessarily, it was said, the new refrigerators and radios would not be available until after the European war was ended. D. R. Moffatt, for his part, stated that "when the need for essential war items ceases, it is hoped that our new program, will keep our greatly enlarged plant with its hundreds of new employees busy and happy in the years ahead."

S S S

KRALL NAMED VICE-PRESIDENT OF TYLER FIXTURE

THE appointment of J. W. Krall to the position of executive vice-president effective April 1, has been announced by Jerry Tyler, president of Tyler Fixtures Corp. Mr. Krall will also serve on the Board of Directors for the Corporation.

"Expansion of the Tyler Fixture Corp. through the acquisition of plants in Detroit, Mich., and Cobleskill, N. Y., required the services of one with Mr. Krall's experience and ability to direct the expansion program," said Mr. Tyler.

Mr. Krall is widely known in the refrigeration industry through his former association as manager of the Refrigeration Division of Detroit Lubricator Co.

S S S

CROGGIN JOINS DETROIT LUBRICATOR COMPANY

THE appointment of F. G. Croggin as manager of the Refrigeration Division of Detroit Lubricator Co. has been announced by E. J. Doucet, general sales manager. Mr. Croggin will assume his duties on April 1, 1945, at which date the resignation of J. W. Krall, present manager, will become effective.

Mr. Croggin has been with Detroit Lubricator Co. for 18 years in a sales and administrative capacity. "His close contact with the refrigeration industry for the past 10 years well qualifies him for his new responsibilities," says Mr. Doucet.

ALCO REOPENS CHICAGO OFFICE

THE Chicago office of Alco Valve Company, manufacturers of air conditioning and refrigeration control valves, has recently been reopened with John A. Schenk taking over as field engineer.

Mr. Schenk previously managed Alco's Chicago office from 1936 until it was closed by war restrictions in April, 1942. Since that time he had been at the home plant in St. Louis, where he handled priority material allotments, production coordination, and later served as application engineer.

John A. Schenk

Born in Mt. Vernon, Ind., Mr. Schenk received his degree in electrical engineering at the University of Detroit, where he was chairman of the student chapter of the American Institute of Electrical Engineers and a member of Tau Phi, honorary scholastic fraternity.

After a year on domestic refrigeration in the research laboratory of Sunbeam Electric & Mfg. Co., he joined Alco in January, 1935. He spent a year in the engineering department working on research and design before going to Chicago. He is a member of the A.S.R.E.

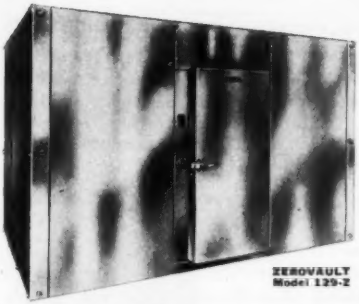
The Chicago office, located at 866 Civic Opera Building, 20 North Wacker Drive, will carry no stock.

S S S

REFRIGERATION SERVICEMAN AWARDED MEDAL OF HONOR

FORMERLY an employee of the Everlast Refrigeration Co., 449 Fourth Ave., New York City, Second Lieut. Charles W. (Red) Shea, Jr., was welcomed home recently by Mayor La Guardia of New York, in a reception at City Hall and by his neighbors in the Highbridge section of the Bronx at a rally in Veterans Memorial Hall, the Bronx County Building.

Lieut. Shea won the Medal of Honor for outstanding heroism in action at Mt. Dominae, Italy, last May 12 by wiping out three enemy machine gun nests. He was commissioned in the field on October 31 after having been a Technical Sergeant of the 305th Infantry of the 88th Division.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Complete with Single Phase
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McDOUGALL REPRESENTS SUPERIOR VALVE IN THE SOUTH

REPRESENTATION for Superior Valve & Fittings Co., Pittsburgh, Pa., in the States of Tennessee, North Carolina, Georgia, Florida, Alabama, and Mississippi is now through Ben M. McDougall whose headquarters are 423 C. & S. National Bank Bldg., Atlanta, Ga.

BEN M. McDOUGALL

A native of Louisiana and graduate engineer from Southwestern Louisiana Institute, Mr. McDougall entered the refrigeration industry in 1940 as a manufacturers agent for Alco Valve Co. and Marlo Coil Co. He later joined the Alco Valve Co. engineering department and in August, 1944 established his present headquarters where he is now representing several manufacturers.

S S S

DAY & NIGHT COMPANY JOINS DRESSER INDUSTRIES

NEGOTIATIONS have been completed and approved by the stockholders of the Day & Night Manufacturing Company, Monrovia, California, for the affiliation of that company with Dresser Industries, Inc. Dresser Industries, composed of a group of companies joined together by common ownership, serves chiefly the gas and oil industries; manufacturing derricks, gas holders, tanks, pumping machinery, compressors, etc.

The Day & Night Manufacturing Company has been in business in Monrovia since 1909, and has become one of the country's leading manufacturers of electric water and beverage coolers and gas water heaters.

S S S

MIESSEMER HEADS WHOLESALE BUSINESS IN PHOENIX

W. C. MIESSEMER, who had been an active stockholder in the J. Carl White Company for the past four years, has purchased the entire interests of the company. The new name of the corporation is "Arizona Refrigeration Supplies, Inc." located at 231 South Central Ave., Phoenix, Ariz. Well known refrigeration equipment manufacturers will be represented.

JOHNSTON JOINS WEATHERHEAD

JOHN P. JOHNSTON has joined the Weatherhead Company as refrigeration engineer for the West Coast office in Glendale, California, J. A. Strachan, refrigeration division manager, has announced.

During the past five years, Mr. Johnston was engaged in design engineering at the Douglas Aircraft Company of California, where he conducted research on the application and design of equipment for heating and air conditioning aircraft. Prior to that connection, he spent six years in the heating and refrigeration industry and was associated with Carrier Corporation of Syracuse, New York, in Research and Field Engineering.

JOHN P. JOHNSTON

S S S

EMPLOYEE VETERANS ACCEPT ARMY-NAVY AWARD

VETERANS of World War II, honorably discharged from the Army, Navy and Marine Corps, hang up their uniforms, and, in what is believed the first case on record, accept for fellow war workers the fourth Army-Navy "E" award received by the Brown Instrument Company, Philadelphia, a division of Minneapolis-Honeywell Regulator Co.

The Brown company has rehired every honorably discharged veteran former worker who has sought reemployment. Seated, left to right: John Bodner, Alex. Blank, Otto Kugler, Leo Geese, George Strubel and Jim Shockley. Standing, left to right: H. H. Ehrhart, George Schwinn and Francis Nealis.

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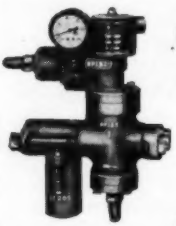

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FLOW CONTROLS, INC.
347 N. Pulaski Rd., Chicago 24, Ill.

PEDDER AND GILBERT HANDLE FRIGIDAIRE ADVERTISING

THE appointment of James F. Pedder as advertising manager and Ellsworth Gilbert, sales promotion manager of the Frigidaire Division of General Motors, Dayton, Ohio has been announced by Lee A. Clark, assistant general sales manager of the Division.

J. F. PEDDER

E. GILBERT

In making this announcement, Mr. Clark pointed out that these appointments go hand in hand with a realignment of functions, whereby all advertising, display, publicity, promotional and training activities for all Frigidaire appliance, commercial refrigeration and air conditioning products, formerly the responsibility of four different departments, now will be centered in two newly created departments, the advertising department and the sales promotion department, under the direction of Mr. Pedder and Mr. Gilbert respectively. With this type of organization, all "customer influence" functions for all Frigidaire products are the responsibility of the advertising Department. Likewise, all activities designed to inform, train and stimulate the Selling Organization are the responsibility of the Sales Promotion Department.

Mr. Clark also announced that T. W. Markham, formerly advertising and promotion manager of Frigidaire's Commercial Division, had left the employ of the Frigidaire Division to establish a Frigidaire dealership in Southern California in Frigidaire's Los Angeles District. Mr. Markham has been associated with Frigidaire since 1927 in various sales and advertising capacities and was for some time manager of the Priorities Section of Frigidaire's War Contracts Division.

S S S

SEARS OPENS REFRIGERATOR REPAIR PLANT

A REFRIGERATOR repair and reconditioning factory for servicing Coldspot refrigerators has been opened at Webster, N. Y., by Sears Roebuck & Co. The establishment will be under the supervision of Oran L. Lockett. It will serve as an outlet for approximately 20 Sears stores in that territory. It is expected that local people will be employed and they will be trained in refrigerator service work. Units now being returned to Boston and Philadelphia for repairs from that territory will be serviced in the new factory.

S S S

GENERAL CONTROLS CATALOG

A NEW catalog and price list on thermal expansion valves, solenoid valves, and strainers has been issued by General Controls. The catalog is well illustrated and includes complete data on the use of type V-200 thermal valves, K-20 and K-15 series solenoid valves, and S-5 series strainers. A complete price schedule is included. Catalog can be secured from any of the branch offices.

WEST COAST CONTROL SERVICE

Cold Controls • Pressure Switches

One year guarantee on all repairs

Original Factory Specifications

UTILITY THERMOSTAT CO.

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Servicemen—Put us to work for you when you need parts and supplies. Most items are now in stock ready for delivery or shipment.

You can DEPEND on BLYTHE

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HEATING & COOLING SUPPLY
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Catalogs are again available
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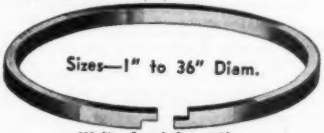

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QUALITY RINGS SINCE 1921

CHECK DOOR GASKETS ON EVERY JOB

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WANTED—Refrigeration Instructor. Practical man with sound knowledge of domestic refrigeration servicing and repair. Permanent job, instructing shop classes. Send qualifications, photo and salary expected. Boston Technical Institute, 1845 E. 9th St., Cleveland 15, Ohio.

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WANTED—REFRIGERATION SERVICE MEN. We offer steady employment—High wages, plus Car Allowance and Commissions on new equipment sales to experienced domestic and commercial servicemen. Excellent opportunity for advancement. Make arrangements now to work for a large, long established Service Company holding service contracts with national manufacturers, such as Kelvinator, Stewart Warner, Hot Point and others. Write us today, giving experience, background, and other pertinent details. Murphy & Miller, Inc., 1326 S. Michigan Ave., Chicago 5, Illinois.

FOR SALE—Universal Tools: pipe wrench, channellock pliers, adjustable wrench, Ceetee pliers, diagonal cutters, hammer, screwdriver, vise-grips, hacksaw, cold chisel, 10 piece set, $19.85. Orders shipped promptly. Remit with order. Catalogue free with order. We have it—can get it—or it isn't made. Dealers Tool Supply, 1527 Grand Ave., Kansas City, Mo.

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In Canada: Gray-Bonney Tool Company, Ltd., St. Clarens & Royce Aves., Toronto